

SHARP SERVICE MANUAL

CODE: 00ZERA490VSME

ELECTRONIC CASH REGISTER

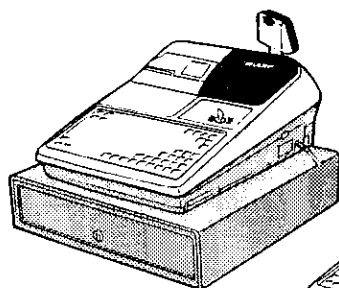
MODEL ER-A490

SRV Key : LKGIM7113BHZZ

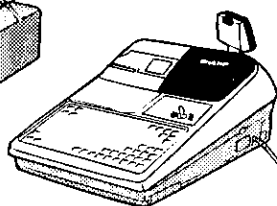
PRINTER : PR-58A: For TQ/TR/TS

PR-58M: For KA/KB

(For "V" version)



For KA/KB



For TQ/TR/TS

CAUTION

EXTREME CAUTION MUST BE TAKEN WHEN SERVICING THIS MACHINE. EVEN THOUGH THE MODE SWITCH IS IN THE OFF POSITION, VOLTAGE IS STILL SUPPLIED TO THE ENTIRE MACHINE.

WHEN WORKING ON THIS MACHINE MAKE SURE THAT THE POWER CORD IS REMOVED FROM THE WALL OUTLET.

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PARTS GUIDE

Parts marked with "△" is important for maintaining the safety of the set. Be sure to replace these parts with specified ones for maintaining the safety and performance of the set.

SHARP CORPORATION

This document has been published to be used for after sales service only.
The contents are subject to change without notice.

CAUTION FOR THE FUSE F1

The fuse F1 is incorporated to protect the printer thermal head. To replace the fuse, please use a fuse with a rating "1.5 A/125 V". Parts code: QFS-A1037CCZZ

CHAPTER 1. SPECIFICATIONS

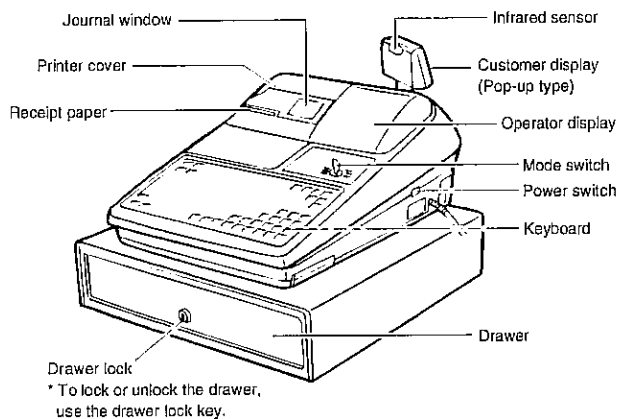
1. Appearance/Rating

1) Appearance

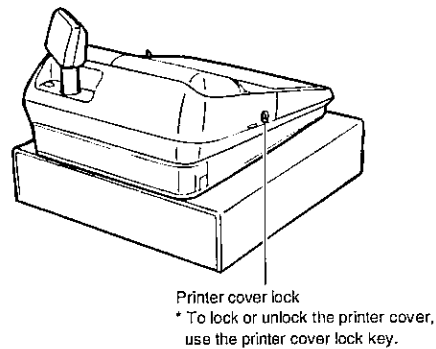
ER-A490

(For KA/KB)

■ Front view

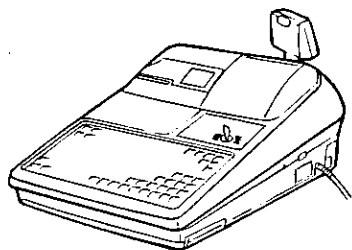


■ Rear view

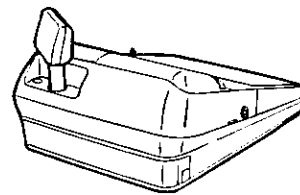


(For TQ/TR/TS)

■ Front view



■ Rear view



2) Rating

Power source	AC local voltage ($\pm 10\%$) 60Hz
Power consumption	Standby: 14 W Maximum: 79 W with options installed.
Operating temperature	0°C–40°C (32°F–104°F)
Operating humidity	10%–90% (RH)
Physical dimensions, including the drawer	340(W) × 433(D) × 198(H) mm: For TQ/TR/TS 421(W) × 448(D) × 302(H) mm: For KA/KB
Weight	7.0 kg: For TQ/TR/TS 15.0 kg: For KA/KB

2. Keyboard

1) Standard keyboard layout

↑ RCPT	↑ JOURNAL	6	7	8	9	10	8	16	24	32	40	48	56	64
RCPT	CASH #	1	2	3	4	5	7	15	23	31	39	47	55	63
VAT	GC RCPT	#	AMT	PLU/ SUB	NC	L3	6	14	22	30	38	46	54	62
NS	AUTO	⊗	•	CL	GLU	L2	5	13	21	29	37	45	53	61
⊖1	⊖2	7	8	9	NBAL	L1	4	12	20	28	36	44	52	60
%1	%2	4	5	6	CR1	CR2	3	11	19	27	35	43	51	59
PO	RA	1	2	3	EX1	CH	2	10	18	26	34	42	50	58
RF	∞	0	00	000	ST	TL	1	9	17	25	33	41	49	57

Fig. 2-1

2) Key top name

① Standard key top

KEY TOP	DESCRIPTION
0 to 9, 00	Numeric keys
000	000 key
↑ RECEIPT	Receipt paper feed key
↑ JOURNAL	Journal paper feed key
•	Decimal point key
⊗	Multiplication key
CL	Clear key
DEPT. 1 ~ 10	Department 1 ~ 10 keys
PLU 1 ~ 64	Direct PLU 1 to 64 keys
PLU/SUB	PLU/SUB department key
VAT	Value added tax key
#	Non-add code entry key
CASH#	Cashier code entry key
RCPT	Receipt print key
⊖ 1	Discount 1 key
⊖ 2	Discount 2 key
AUTO	Automatic sequencing key
%1	Percent 1 key
%2	Percent 2 key
EX1	Foreign currency exchange 1 key
NS	No-sale key
RA	Received on account key
PO	Paid out key
RF	Refund key
∞	Void key
CR1	Credit 1 key
CR2	Credit 2 key
CH	Cheque key
AMT	Amount key
ST	Subtotal key
TL	Total (cash total) key
L1	PLU's level shift 1 key
L2	PLU's level shift 2 key
L3	PLU's level shift 3 key
NC	New guest check key
GLU	Guest look up key
NBAL	New balance key
GC RCPT	GC receipt issue key

② Option key top

KEY TOP	DESCRIPTION
DEPT. 11 ~ 50	Department 11 ~ 50 keys
PLU 65 ~ 118	Direct PLU 1 to 118 keys
% 3	Percent 3 key
% 4	Percent 4 key
⊖ 3	Discount 3 key
⊖ 4	Discount 4 key
AUTO 2 ~ 10	Automatic sequencing 2 ~ 10 key
RA 2	Received on account 2 key
PO 2	Paid out 2 key
CR3 ~ 8	Credit 3 ~ 8 key
CH2 ~ 4	Cheque 2 ~ 4 key
CA2	Cash total 2 key
EX2 ~ 9	Foreign currency exchange 2 ~ 9 key
DIFFER ST	Difference subtotal key
1/2	1/2 key
SLIP	Slip print key
PINT	Pint key
FINAL	Tentative finalize key
RCPT BILL	Bill printing on receipt key
BT	Bill totalizing/Bill transfer key
B.S.	Bill separation key
CASH TIP	Cash tip key
NON CASH TIP	Non cash tip key
TIP PAID	Tip paid key
VP	Validation print key
GC COPY	Guest check copy key

3. Mode switch

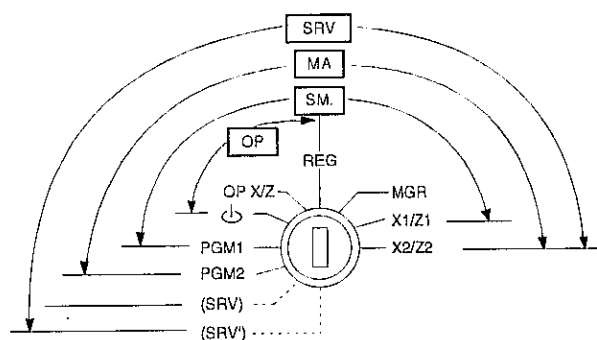


Fig. 3-1

- * The key can be removed in the REG or OFF position.
- * In the SRV' mode, key inputs are prohibited and no display is made.
- * With the key in the off position power is still supplied to the main PWB.

[Functions]

- Function for each key position
- SRV': System reset
- SRV: Service mode (Service programming)
- PGM2: Allows programming of an item that is not changed frequently, in addition to the PGM1 mode programming.
- PGM1: Allows programming of items frequently changed (e.g. department, PLU pricing, and discount rate setting).
- OP/XZ: Allows X or Z operation by cashiers.
- REG: Allows registrations.
- MGR: Allows the operations, by authorized person such as a manager (e.g. correction after transaction finished or cancellation of entry limits), which are not permitted to ordinary cashiers.
- X1/Z1: Allows reading and resetting of a day's sales total.
- X2/Z2: Allows reading or resetting sales totals in a specified period.
- ⏻: Switches off the display to prevent keyboard entries.

(The setting does not turn off the AC power.)

4. Display

1) Layout

① Operator display

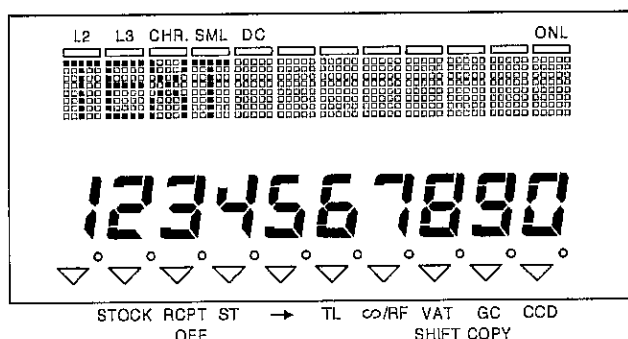


Fig. 4-1

	Dot display	7 segment display
No. of positions	12	10
Color of display	Green	Green
Character size	6.6 (H) × 4.6 (W) mm	10.0 (H) × 4.3 (W) mm

② Customer display

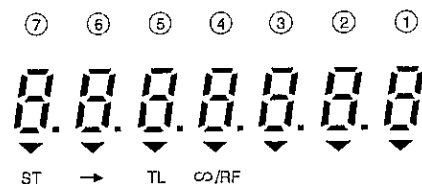


Fig. 4-2

No. of positions	7
Color of display	Green
Character size	10 (H) × 4.5 (W) mm

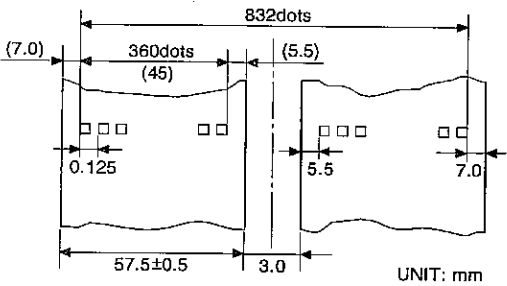
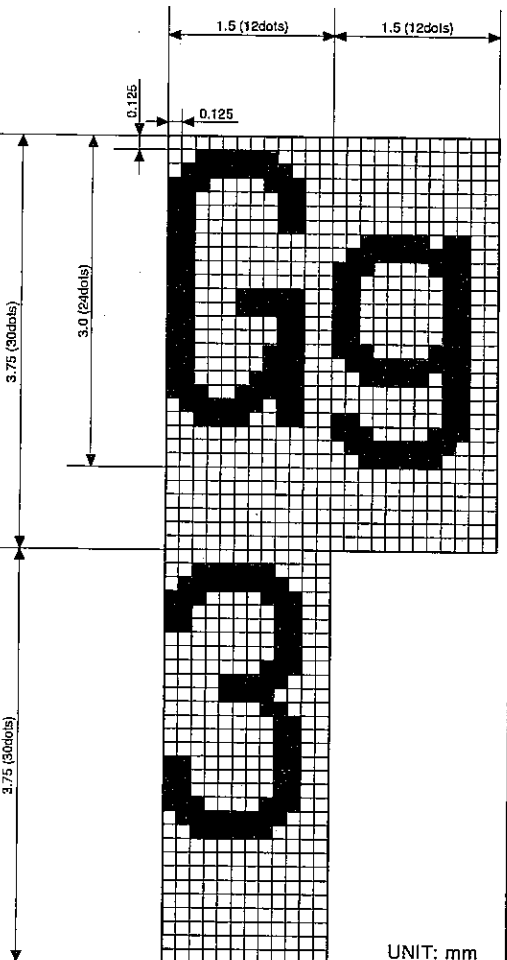
Lamps

Display contents	Description
L2	The lamp lights up when PLU level is 2.
L3	The lamp lights up when PLU level is 3.
CHR.	The lamp lights up when character key sheet mode in text setting
SML	The lamp lights up when small characters are being inputted in text setting
DC	The lamp lights up when double width characters are being inputted in text setting.
ONL	The lamp lights up when the machine is connected to the online transmission line; and it goes off when the machine is disconnected from the line. The lamp blinks during data transmission.
STOCK	The lamp lights up when stock is empty state.
RCPT OFF	The lamp lights up when receipt is OFF state.
ST	The lamp lights up when a subtotal is displayed.
→	The lamp lights up when change amount is displayed after tendering.
TL	The lamp lights up when a transaction is finalized with CASH, CHECK, CREDIT, or CHARGE key, however, the lamp does not light up when a transaction is finalized with an amount tendered entry.
∞/RF	The lamp lights up when the void or refund key is pressed.
VAT SHIFT	The lamp lights up when the vat shift key is pressed.
GC COPY	The lamp lights up when the guest check copy mode.
CCD	The lamp lights up when the CCD registration.

5. Printer (PR-58A: For TQ/TR/TS PR-58M: For KA/KB)

1) Printer

Item	Description
No. of station	2: Receipt and Journal
Validation	No
Printing system	Line thermal
No. of dot	Receipt: 360 dots Journal: 360 dots
Dot pitch	Horizontal: 0.125 mm Vertical: 0.125 mm
Font	10 dots (W) × 24 dots (H)
Printing capacity	Receipt: Max. 30 characters Journal: Max. 30 characters
Character size	1.25 mm (W) × 3.0 mm (H): At 10 × 24 dots

Item	Description
Print pitch	Column distance: 1.5 mm Row distance: 3.75 mm
Paper feed speed	Approximate 60 mm/s
Reliability	Mechanism: MCBF 5 million lines
Paper end sensor	Yes (Receipt and Journal)
Cutter	Manual
Paper near end sensor	No
Printing area	
Print format	
Option	For PR-58M: ER-01AC (Auto cutter unit)

2) Paper

Item	Description
Name	Heat-quality paper
Roll dimension	57.5 ±0.5 mm in width
Thickness	0.06 mm to 0.08 mm

3) Cutter

Model	Method
PR-58A	Auto
PR-58M	Manual

6. Drawer (For KA/KB)

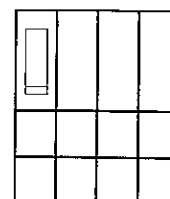
1) Specification

(1) Drawer box and drawer

Model name of the drawer box	SK423
Size	420 (W) × 423 (D) × 114 (H)
Color	Light olive gray
Material	Metal
Bell	—
Release lever	Standard equipment; situated at the bottom
Drawer open sensor	Standard equipment
Separation from the main unit	Allowed with service kit

2) Money case

Separation from the drawer	Allowed
Separation of the bill compartments from the coin compartments	Disallowed
Bill separator	Standard
Number of compartments	4B/8C



4B/8C

3) Lock

- Location of the lock: Front
- Method of locking and unlocking: To lock, insert the drawer lock key into the lock and turn it 90 degrees counterclockwise. To unlock, insert the drawer lock key and turn it 90 degrees clockwise.
- Key no.: SK1-1

CHAPTER 2. OPTIONS

1. System configuration

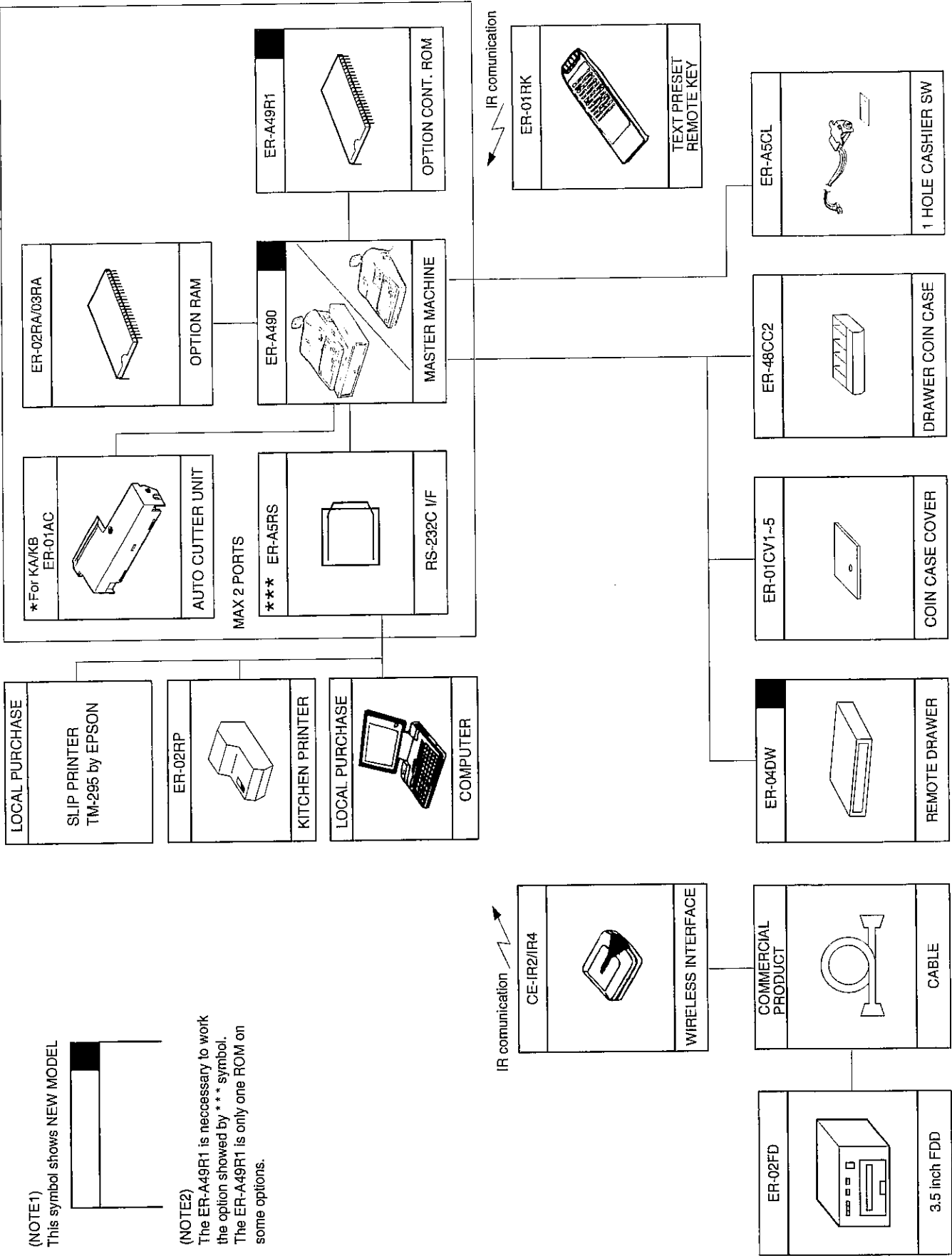


Fig. 1-1

2. Options

NO	NAME	MODEL	DESCRIPTION
1	ONE HOLE CASHIER KEY	ER-A5CL	
2	EXPANSION RAM CHIP	ER-02RA	128K bytes RAM chip
		ER-03RA	512K bytes RAM chip
3	ON-LINE SYSTEM	ER-A5RS	2ports RS-232 I/F
4	CONTROL ROM	ER-A49R1	Control for ER-A5RS
5	PRESETS LOADER	ER-02FD	FD unit
6	PROGRAMMING REMOTE KEYBOARD	ER-01RK	IR I/F text preset keyboard
7	WIRELESS INTERFACE	CE-IR2 / IR4	For IR communication
8	COIN CASE	ER-48CC2	
9	COIN CASE COVER	ER-01CV1~5	
10	KITCHEN PRINTER	ER-02RP	
11	REMOTE DRAWER	ER-04DW	
12	AUTO CUTTER UNIT	ER-01AC	For KA/KB

3. Service options

NO.	NAME	PARTS CODE	PRICE RANK	DESCRIPTION
1	SERVICE KEY	LKGIM7113BHZZ	AF	For the mode switch
2	DRIP-PROOF SWITCH COVER	GCOVB7108BHZZ	BA	
3	MODE KEY GRIP COVER	LKGIM7126RCZZ	AL	OP key only
4	JOURNAL NEAR END SENSOR	DUNT-4945BHZZ	AY	
5	DRAWER FIXING KIT	DKIT-8633RCZZ	BE	For KA/KB
6*	CLERK COVER "B"	GCOVA7107BHZZ	AG	For ER-A5CL
	CLERK ANGLE	LANGT7581BHZZ	AM	
	SCREW	XUSSD26P08000	AA	

* From 1995 September production, part No. 6 is packed together with ER-A5CL.

4. Service tools

NO.	NAME	PARTS CODE	PRICE RANK
1	EXPANSION PWB	CKOG-6708RCZZ	BU
2	RS-232 LOOP BACK CONNECTOR FOR ER-A5RS	UKOG-6705RCZZ	BC

5. Supplies

NO.	NAME	PARTS CODE	PRICE RANK	DESCRIPTION
1	ROLL PAPER	TPAPR6656RC05	BA	5rolls/pack
2	KEY SHEET	PSHEK6830BHZZ	AU	Programming character sheet
		PSHEK6840BHZZ	AS	Standard character sheet
		PSHEK6828BHZZ	AK	Blank character sheet

6. Options

For installation of the options, refer to the Installation Manual which is issued separately.

7. How to use service tools

7-1. Expansion PWB: CKOG-6708RCZZ

- External view

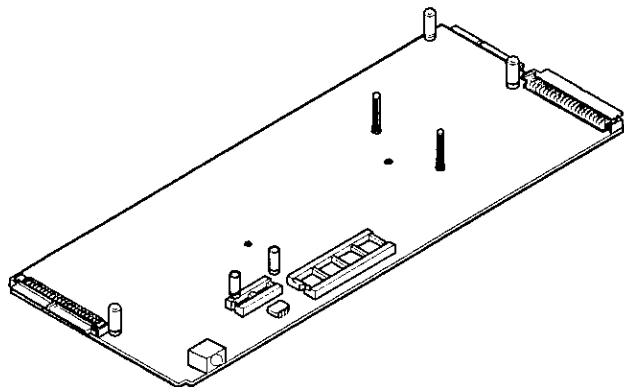


Fig. 7-1

Purpose 1: Used for servicing and repairing of options (such as the and the ER-A5RS) which are connected with the main body option connector.

[Procedure 1]

Use an insulator base as shown in Fig. 7-2 (shaded section) and perform servicing.

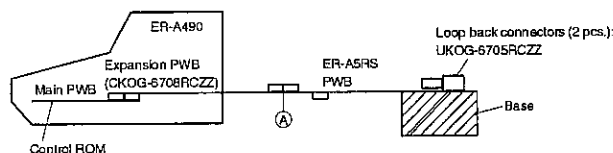


Fig. 7-2

To check the option I/F PWB from the solder side, connect the I/F PWB to OPTCN2. To check from the parts side, connect to OPTCN3.

(Note) The option I/F PWB should be held horizontally so that no excessive stress is applied to connecting section (A) in Fig. 7-2.

[Procedure 2]

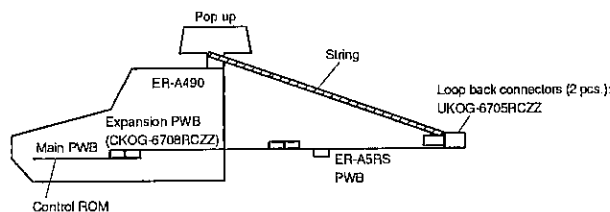


Fig. 7-3

Put a string between the pop up and the option PWB, as shown in Fig. 7-3. Adjust the length of the string so that the CKOG-6708RCZZ and the option PWB are not binding. Then perform servicing.

CHAPTER 3. SRV. RESET AND MASTER RESET

1. SRV. reset (Program Loop Reset)

Used to return the machine back to its operational state after a lock-up has occurred.

Procedure

• Method 1

- 1) Unplug the AC cord from the wall outlet.
- 2) Set the mode switch to (SRV') position.
- 3) Plug in the AC cord to the wall outlet.
- 4) Turn to (SRV) position from (SRV') position.

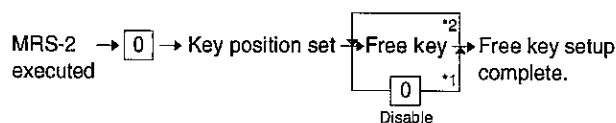
• Method 2

- 1) Set the mode switch to PGM2 position.
- 2) Turn off the AC switch.
- 3) While holding down JOURNAL FEED key and RECEIPT FEED key, Turn on the AC switch.

Note: When disassembling and reassembling always power up using method 1 only. Method 2 will not reset the CKDC6.

Note: SRV programming job#926-B must be set to "4" to allow PGM program loop reset.

[key setup procedure]



NOTES:

- *1: When the 0 key is pressed, the key of the key number on display is disabled.
- *2: Push the key on the position to be assigned. With this, the key of the key number on display is assigned to that key position.

Key number	Key name	Key number	Key name
1	Numeric key "0"	9	Numeric key "8"
2	Numeric key "1"	10	Numeric key "9"
3	Numeric key "2"	11	Numeric key "00"
4	Numeric key "3"	13	Decimal point key
5	Numeric key "4"	14	CL key
6	Numeric key "5"	15	⊗ key
7	Numeric key "6"	16	ST key
8	Numeric key "7"	17	TL key

2. Master reset (All memory clear)

There are two possible methods to perform a master reset.

• MRS-1

Used to clear all memory contents and return machine back to its initial settings and return keyboard back to default keyboard.

Procedure

- 1) Unplug the AC cord from the wall outlet.
 - 2) Set the MODE switch to the (SRV') position.
 - 3) Plug in the AC cord to the wall outlet.
 - 4) While holding down JOURNAL FEED key, turn to (SRV) position from (SRV') position.
- MRS-2
Used to clear all memory and keyboard contents.
This reset returns all programming back to defaults. The keyboard must be entered by hand.
This reset is used if an application needs different keyboard layout other than that supplied by a normal MRS-1.

Procedure

- 1) Unplug the AC cord from the wall outlet.
 - 2) Set the MODE switch to the (SRV') position.
 - 3) Plug in the AC cord to the wall outlet.
 - 4) While holding down JOURNAL FEED key and RECEIPT FEED key, turn to (SRV) position from (SRV') position.
 - 5) Key position assignment:
- * After the execution of MRS-2, only the RECEIPT FEED and JOURNAL FEED keys can remain effective on key assignment. Any key can be assigned on any key position on the main keyboard.

CHAPTER 4. HARDWARE DESCRIPTION

1. Hardware block diagram

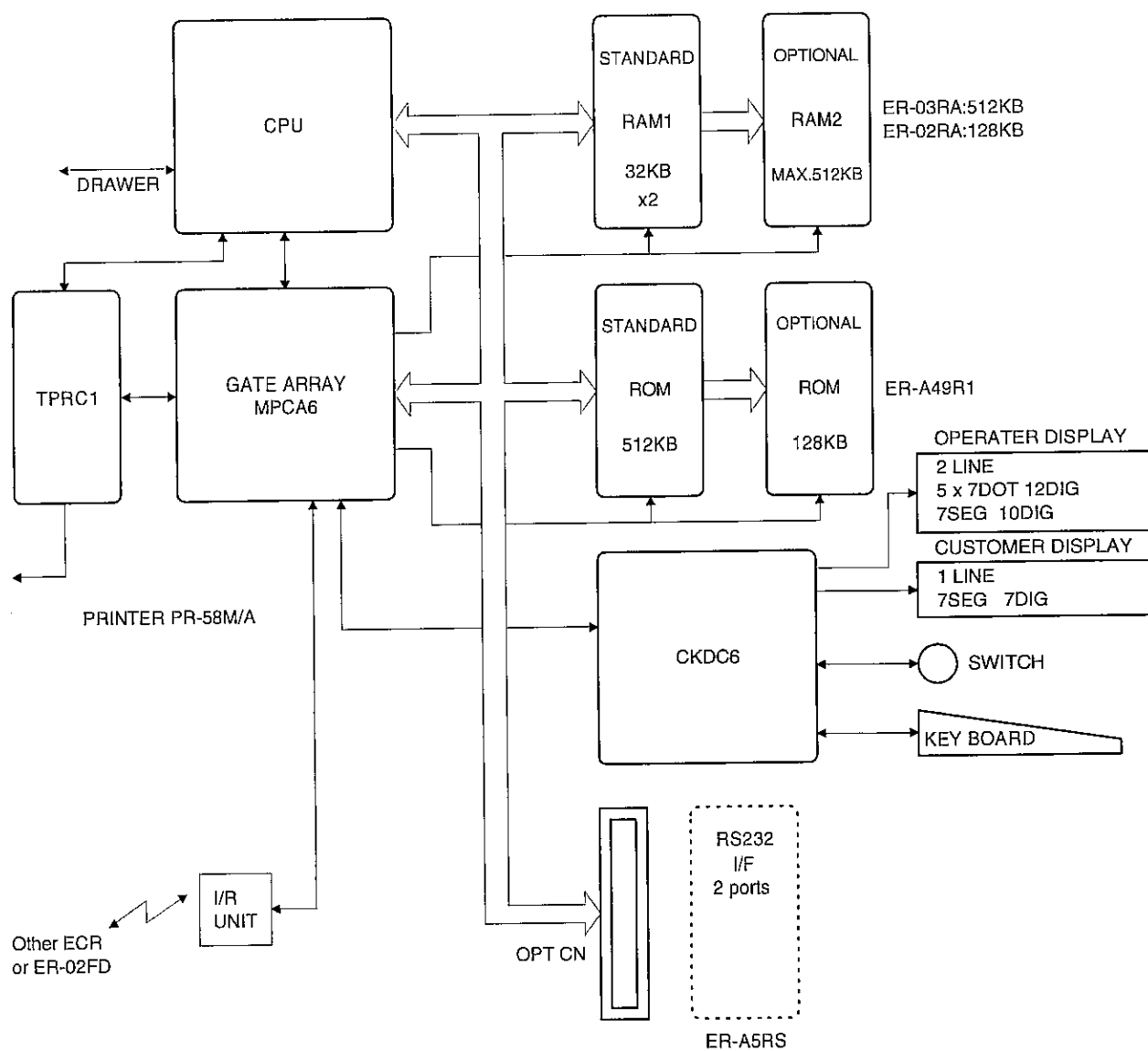
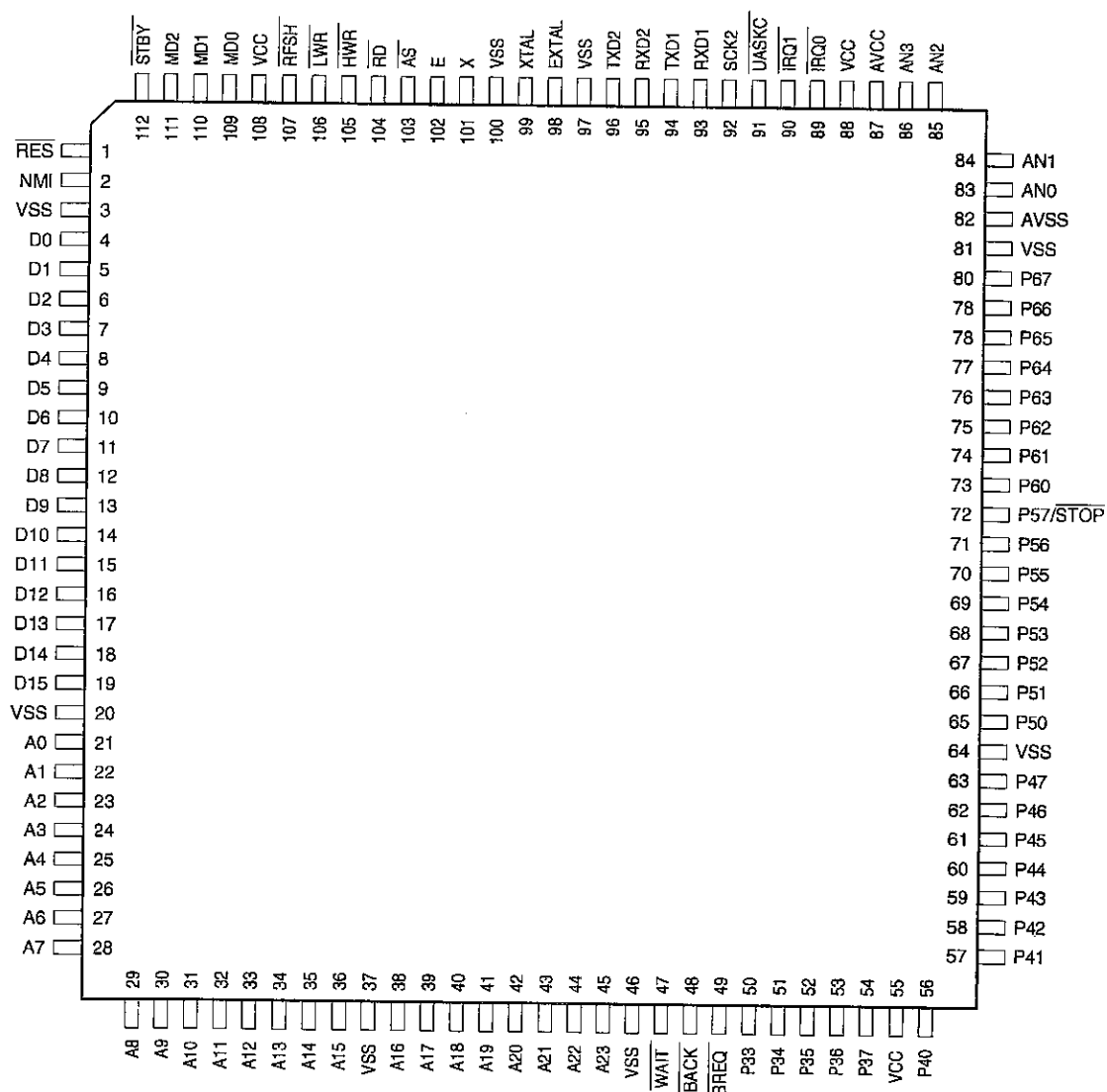


Fig. 1-1

2. Description of main LSI's

2-1. CPU (HD6415108-10)

1) Pin configuration



HD6415108-10 pin configuration

Fig. 2-1

2) Block diagram

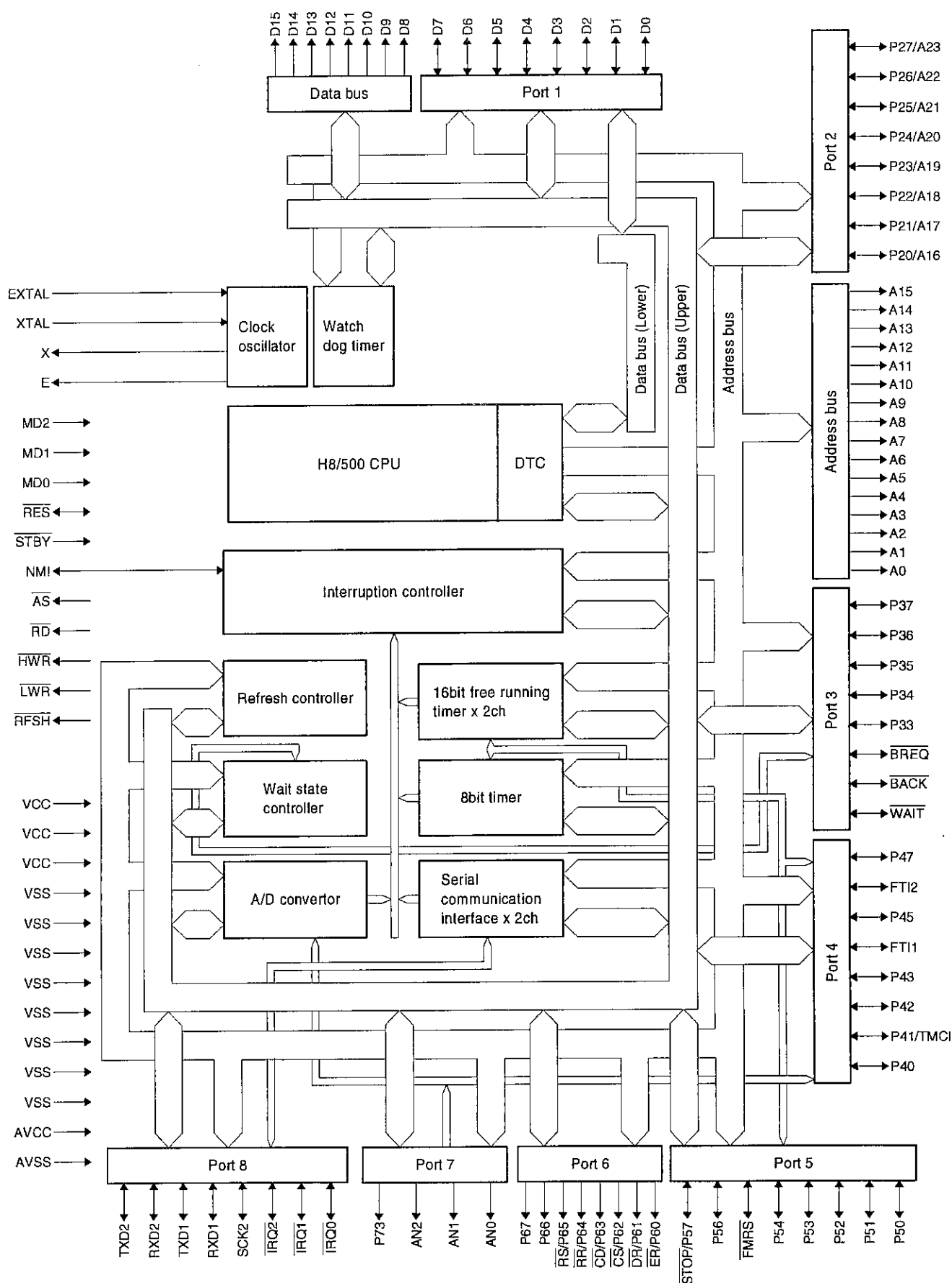


Fig. 2-2

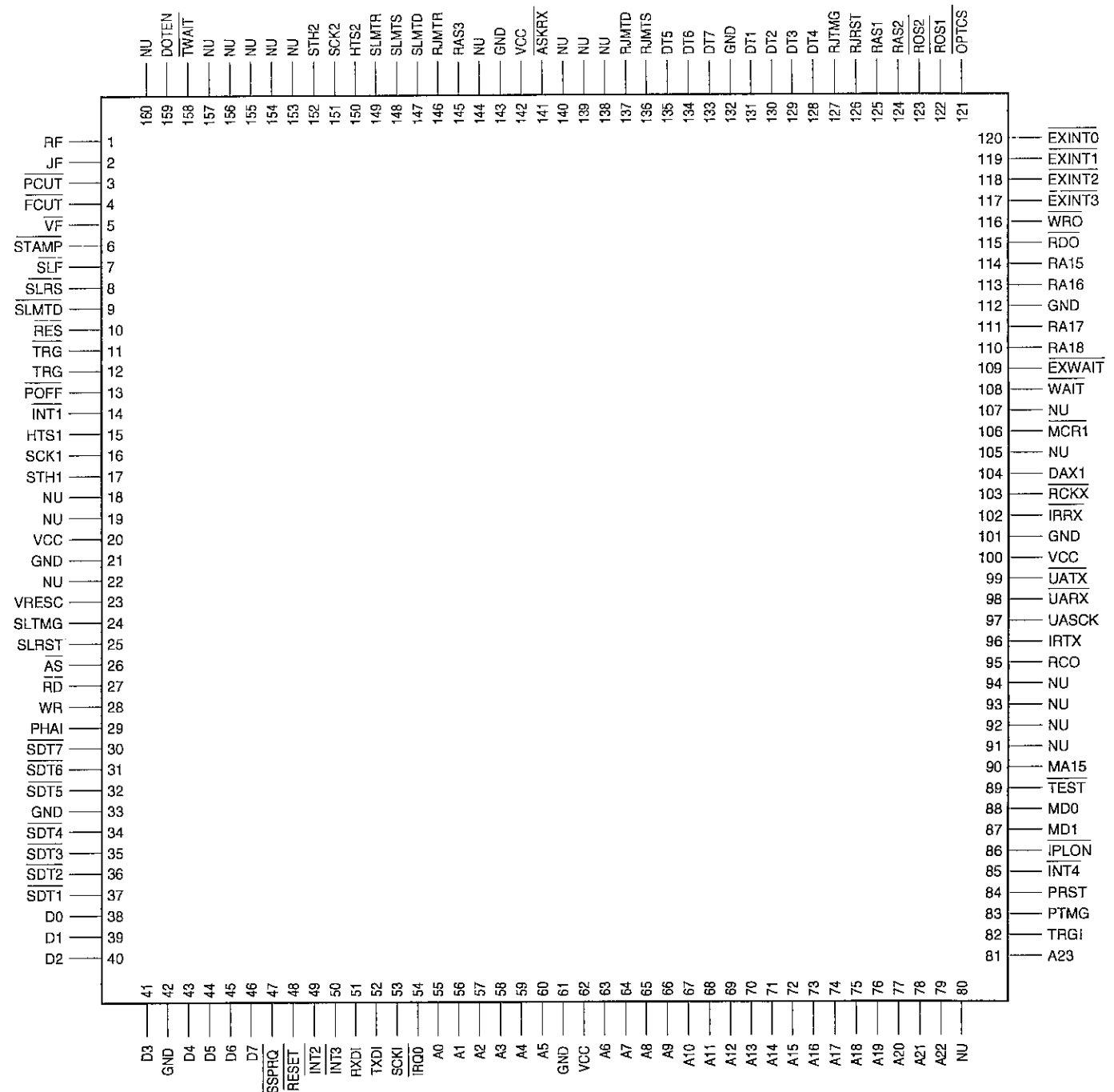
3) Pin description

Pin No.	Symbol	Signal name	In/ Out	Function
1	RES	RESET	I/O	Reset input
2	NMI	NMI	In	Non-maskable interrupt input for SSP interrupt input.
3	VSS	NU	In	GND
4	D0	Nu	In	GND
5	D1	Nu	In	GND
6	D2	Nu	In	GND
7	D3	Nu	In	GND
8	D4	Nu	In	GND
9	D5	Nu	In	GND
10	D6	Nu	In	GND
11	D7	Nu	In	GND
12	D8	D0	I/O	Data bus
13	D9	D1	I/O	Data bus
14	D10	D2	I/O	Data bus
15	D11	D3	I/O	Data bus
16	D12	D4	I/O	Data bus
17	D13	D5	I/O	Data bus
18	D14	D6	I/O	Data bus
19	D15	D7	I/O	Data bus
20	VSS	NU	In	GND
21	A0	A0	Out	Address bus
22	A1	A1	Out	Address bus
23	A2	A2	Out	Address bus
24	A3	A3	Out	Address bus
25	A4	A4	Out	Address bus
26	A5	A5	Out	Address bus
27	A6	A6	Out	Address bus
28	A7	A7	Out	Address bus
29	A8	A8	Out	Address bus
30	A9	A9	Out	Address bus
31	A10	A10	Out	Address bus
32	A11	A11	Out	Address bus
33	A12	A12	Out	Address bus
34	A13	A13	Out	Address bus
35	A14	A14	Out	Address bus
36	A15	A15	Out	Address bus
37	VSS	NU	In	GND
38	A16	A16	Out	Address bus
39	A17	A17	Out	Address bus
40	A18	A18	Out	Address bus
41	A19	A19	Out	Address bus
42	A20	A20	Out	Address bus
43	A21	A21	Out	Address bus
44	A22	A22	Out	Address bus
45	A23	A23	Out	Address bus
46	VSS	NU	In	GND
47	P30	WAIT	In	Wait signal
48	P31	BACK	Out	Bus control request acknowledge
49	P32	BREQ	In	Bus control request
50	P33	DOPS	In	Drawer open signal
51	P34	DR0	Out	Drawer open signal
52	P35	DR1	Out	Remote drawer open signal
53	P36	DR3	Out	Remote drawer No.3 open signal (NU)
54	P37	DR4	Out	Remote drawer No.4 open signal (NU): GND
55	VCC	VCC	In	+5V
56	P40	NU	Out	NU
57	P41	PTMG	In	Printer timing signal

Pin No.	Symbol	Signal name	In/ Out	Function
58	P42	NU	Out	NU
59	P43	NU	Out	NU
60	P44	PRST	In	Printer reset signal
61	P45	NEJ	In	Near end sensor journal side
62	P46	SHEN	In	CKDC Interface shift enable signal
63	P47	OPBS	Out	Option ROM/RAM PWB sens signal
64	VSS	VSS	In	GND
65	P50	TRGI	Out	NC
66	P51	NU	Out	NC
67	P52	NU	Out	NC
68	P53	NU	In	GND
69	P54	NU	Out	NC
70	P55	NU	In	GND
71	P56	NU	Out	NC
72	P57/STOP	STOP	Out	System reset output. Normally
73	P60	NU	Out	NC
74	P61	J1	In	Thermal head rank: J1
75	P62	J2	In	Thermal head rank: J2
76	P63	NU	In	NC
77	P64	NU	Out	NC
78	P65	NU	Out	NC
79	P66/RCO	RCO	In	+5V
80	P67	NU	In	GND
81	VSS	NU	In	GND
82	AVSS	NU	In	GND
83	AN0	Vrf	In	
84	AN1	NU	In	GND
85	AN2	VPTEST	In	+24V test input
86	AN3	TM	In	
87	AVCC	AVCC	In	+5V
88	VCC	VCC	In	+5V
89	IRQ0	IRQ0	In	Interrupt signal 0
90	IRQ1	IRQ1	In	Interrupt signal 1 (RS-232C)
91	SCK1	UASCK	In	I/R control signal (Shift clock)
92	SCK2	SCK1	In	CKDC Interface sync shift clock
93	RXD1	/JARX	In	I/R control signal (Receive data)
94	TXD1	/JATX	Out	I/R control signal (Transmit data)
95	RXD2	RXD2	In	CKDC Interface shift input data
96	TXD2	TXD2	Out	CKDC Interface shift output data
97	VSS	NU	In	GND
98	EXTAL	EXTAL	In	Crystal oscillator connection
99	XTAL	XTAL	In	Crystal oscillator connection
100	VSS	NU	In	GND
101	PHAI	PHA1	Out	System clock
102	E	NU	Out	NC
103	AS	AS	Out	Address strobe
104	RD	RD	Out	Read
105	HWR	WR	Out	Write
106	LWR	LWR	Out	Nu
107	RFSH	RFSH	Out	Refresh cycle
108	VCC	VCC	In	+5V
109	MD0	MD0	In	+5V (MODE 3)
110	MD1	MD1	In	+5V (MODE 3)
111	MD2	MD2	In	GND (MODE 3)
112	STBY	STBY	In	+5V (Nu)

2-2. G.A (MPCA6)

1) Pin configuration



GATE ARRAY (LZ9AH30)
MPCA6

Fig. 2-3

2) Block diagram

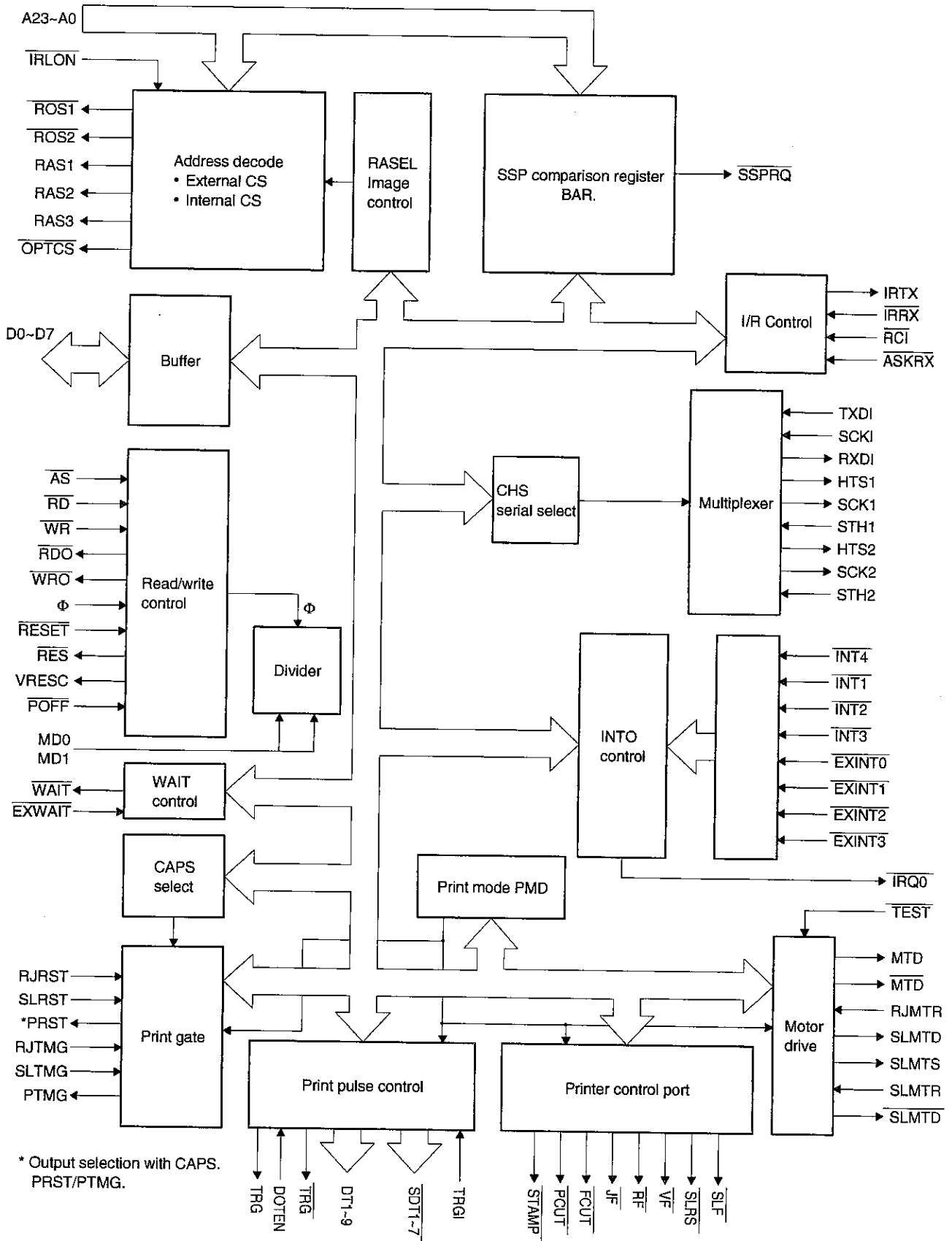


Fig. 2-4

3) Pin description

Pin No.	Signal name	In/ Out	Function
1	RF	Out	Receipt side paper feed solenoid (NU)
2	JF	Out	Journal side paper feed solenoid (NU)
3	PCUT	Out	Printer partial cut signal (NU)
4	FCUT	Out	Printer auto cut signal (NU)
5	VF	Out	Multi line validation paper feed (NU)
6	STAMP	Out	Printer stamp signal (NU)
7	SLFS	Out	Slip printer paper feed signal (NU)
8	SLRS	Out	Slip printer release signal (NU)
9	SLMTD	Out	Slip printer motor drive signal (NU)
10	RES	Out	Peripheral output reset
11	TRG	Out	Dot head trigger signal (NU)
12	TRG	Out	Dot head trigger signal (NU)
13	POFF	In	Power off signal input
14	KRQ	In	Interrupt signal (Key interrupt request)
15	HTS1	Out	8 bit serial port output
16	SCK1	Out	Serial port shift clock output
17	STH1	In	8 bit serial port input
18	RAS VZ	—	Chip select (NU)
19	—	—	Nu
20	VCC	—	+5V
21	VSS	—	GND
22	INTMCR	—	Interrupt (NU)
23	VRESC	Out	Turns active when reset and power down is met
24	SLTMG	In	Slip printer timing signal (NU)
25	SLRST	In	Slip printer reset signal (NU)
26	AS	In	Address strobe
27	RD	In	Read strobe
28	WR	In	Write strobe
29	PHI	In	(ϕ) System clock (7.3728 MHz)
30	SDT7	Out	Slip printer printhead drive signal (dot7) (NU)
31	SDT6	Out	Slip printer printhead drive signal (dot6) (NU)
32	SDT5	Out	Slip printer printhead drive signal (dot5) (NU)
33	VSS	—	GND
34	SDT4	Out	Slip printer printhead drive signal (dot4) (NU)
35	SDT3	Out	Slip printer printhead drive signal (dot3) (NU)
36	SDT2	Out	Slip printer printhead drive signal (dot2) (NU)
37	SDT1	Out	Slip printer printhead drive signal (dot1) (NU)
38	D0	I/O	Data bus 0
39	D1	I/O	Data bus 1
40	D2	I/O	Data bus 2
41	D3	I/O	Data bus 3
42	VSS	—	GND
43	D4	I/O	Data bus 4
44	D5	I/O	Data bus 5
45	D6	I/O	Data bus 6
46	D7	I/O	Data bus 7
47	SSPRQ	Out	SSP interrupt request to CPU
48	RESET	In	MPCA reset
49	TPRCRQ2	In	TPRC Interrupt signal

Pin No.	Signal name	In/ Out	Function
50	INT3	In	Interrupt signal (Nu)
51	RXD2	Out	8 bit serial port output to CPU
52	TXD2	In	8 bit serial port input from CPU
53	SCK1	In	Serial port shift clock input from CPU.
54	IRQ0	Out	Interrupt request to CPU
55	A0	In	Address bus 0
56	A1	In	Address bus 1
57	A2	In	Address bus 2
58	A3	In	Address bus 3
59	A4	In	Address bus 4
60	A5	In	Address bus 5
61	VSS	—	GND
62	VCC	—	+5V
63	A6	In	Address bus 6
64	A7	In	Address bus 7
65	A8	In	Address bus 8
66	A9	In	Address bus 9
67	A10	In	Address bus 10
68	A11	In	Address bus 11
69	A12	In	Address bus 12
70	A13	In	Address bus 13
71	A14	In	Address bus 14
72	A15	In	Address bus 15
73	A16	In	Address bus 16
74	A17	In	Address bus 17
75	A18	In	Address bus 18
76	A19	In	Address bus 19
77	A20	In	Address bus 20
78	A21	In	Address bus 21
79	A22	In	Address bus 22
80	LCDC	—	LCD CS (NU)
81	A23	In	Address bus 23
82	TRGI	In	Dot pulse control/drive signal (GND)
83	PTMG	Out	Printer timing signal
84	PRST	Out	Printer reset signal
85	INT4	In	Interrupt signal (+5V)
86	IPLON	In	To option connector
87	MD1	In	Mode select input (GND)
88	MD0	In	Mode select input (GND)
89	TEST	In	+5V
90	MA15	—	Image address 15
91	MA18	—	Nu
92	MA19	—	Nu
93	RCVRDY1	—	Nu (+5V)
94	RCVRDY2	—	Nu (+5V)
95	RC0	—	Remote control encord signal for CPU
96	IRTX	—	I/R output for LED
97	UASCK	—	I/R serial data shift clock
98	UARX	—	I/R serial data for CPU
99	UATX	—	I/R serial data from CPU
100	VCC	—	+5V
101	VSS	—	GND
102	IRRX	—	I/R input from I/R unit
103	RCRX	—	I/R input from I/R unit
104	DAX1	—	System clock (7.3728MHz)

Pin No.	Signal name	In/ Out	Function
105	DAX2	—	System clock (7.3728 MHz)
106	FCS	—	Fiscal memory chip select
107	MCR2	—	Nu
108	WAIT	Out	Wait request signal
109	EXWAIT	In	External wait control input signal
110	RA18	Out	Nu
111	RA17	Out	Nu
112	VSS	—	GND
113	RA16	Out	Nu
114	RA15	Out	Nu
115	RDO	Out	Expansion RD signal
116	WRO	Out	Expansion WR signal
117	EXINT3	In	Expansion interruption signal 3
118	EXINT2	In	Expansion interruption signal 2
119	EXINT1	In	Expansion interruption signal 1
120	EXINT0	In	Expansion interruption signal 0
121	OPTCS	Out	Chip select base signal for expansion option
122	ROS1	Out	ROM 1 chip select signal
123	ROS2	Out	ROM 2 chip select signal
124	RAS2	Out	RAM 2 chip select signal
125	RAS1	Out	RAM 1 ship select signal
126	RJRST	In	Printer reset signal
127	RJTMG	In	Printer timing signal
128	DOT1	Out	Printer dot signal 4 (NU)
129	DOT2	Out	Printer dot signal 3 (NU)
130	DOT3	Out	Printer dot signal 2 (NU)
131	DOT4	Out	Printer dot signal 1 (NU)
132	GND	—	GND
133	DOT7	Out	Printer dot signal 7 (NU)
134	DOT6	Out	Printer dot signal 6 (NU)
135	DOT5	Out	Printer dot signal 5 (NU)
136	RJMTS	Out	Printer motor drive signal (NU)
137	RJMTD	Out	Printer motor drive signal (NU)
138	DOT9	—	Printer dot signal 9 (NU)
139	DOT8	—	Printer dot signal 8 (NU)
140	SYNC	—	Nu (+5V)
141	ASKRX	—	I/R input from I/R unit
142	VCC	—	+5V
143	GND	—	GND
144	—	—	Nu
145	RAS3	Out	Nu
146	RJMTR	In	Printer motor lock detection signal (NU)
147	SLMTD	In	Nu
148	SLMTS	In	Nu
149	SLMTR	In	GND
150	HTS2	Out	Nu
151	SCK2	Out	Nu
152	STH2	In	Nu
153	—	—	Nu
154	—	—	Nu
155	—	—	Nu
156	—	—	Nu
157	—	—	Nu
158	TWAIT	IN	TPRC Wait signal
159	DOTEN	Out	Dot drive enable signal (NU)
160	RASP	—	Nu

2-3. CKDC6 (HD404728A91FS)

1) General description

The CKDC6 is a 4-bit microcomputer developed for the ER-A490 and provides functions to control the real-time clock, keys, and displays. The basic functions of the CKDC6 are shown below.

- Keys:** The CKDC6 is capable of controlling a maximum of 256 momentary keys. (Sharp 2-key rollover control)
Simultaneous scanning of key and switch
(When a key is scanned, the state of a mode and clerk switch is also buffered. The host can scan the state of switch together with the key entry data at the same time the key is scanned.)
- Switches:** Mode switch with 14 positions maximum
8-bit clerk (cashier) switch
2-bit feed switch
1-bit receipt on/off switch
1-bit option switch
4-bit general-purpose switch (1-bit is used for keyboard select)
- Displays:** 16-column dot display
12-column 7-segment display (column digit selectable)
All column blink controlled for the dot and 7-segment display decimal point and indicators
Programmable patterns for 7-segment display:
Four patterns
Internal driver for 7-segment display
- Buzzer:** Single tone control
- Clock:** Year, month, day of month, day of week, hour, minute
- Alarm:** Hour, minute
- Interrupt request (event control):**
Detection of key input, switch position change, alarm issue, and counter overflow

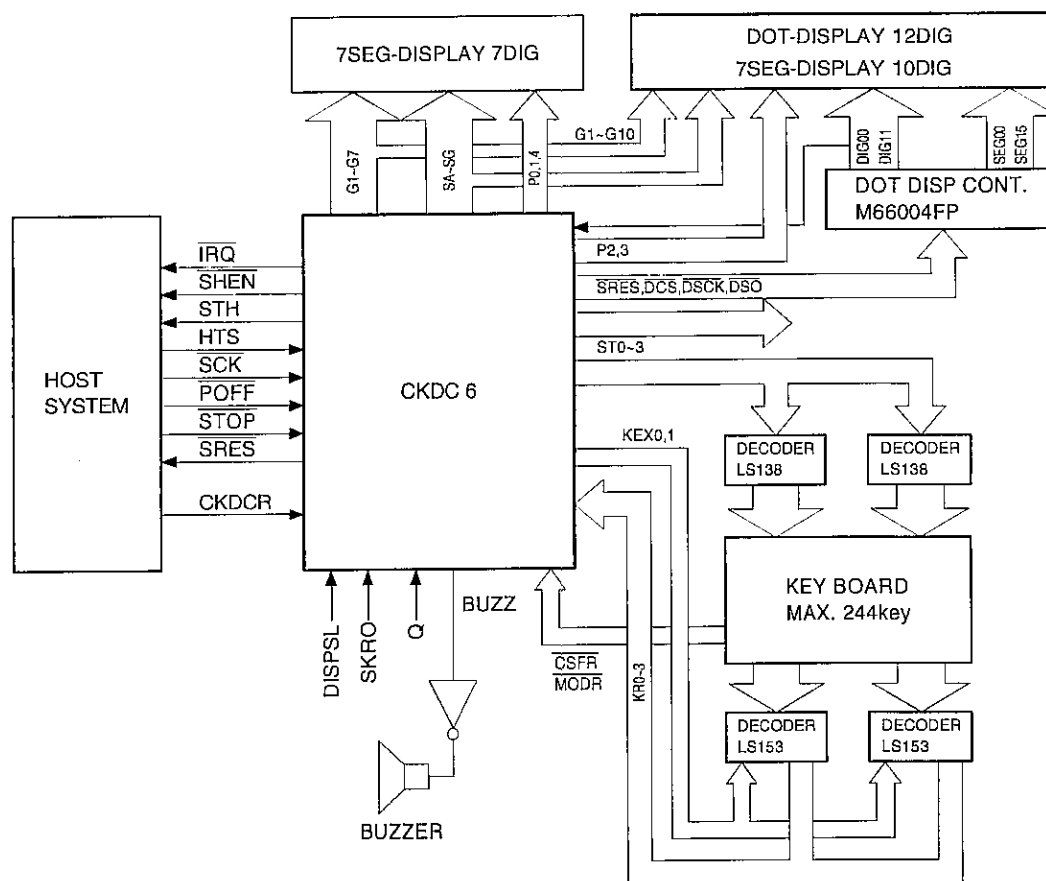


Fig. 2-5

2) Pin assignment

Pin No.	Port	I/O	RESET State	Signal name	I/O	Notes	PULL-UP -DOWN
1	R0 ₁	I/O	H-Z	SB	0	DB4 : SEG-B	PULL-DOWN
2	R0 ₂	I/O	H-Z	SC	0	DB4 : SEG-C	PULL-DOWN
3	R0 ₃	I/O	H-Z	SD	0	DB4 : SEG-D	PULL-DOWN
4	R1 ₀	I/O	H-Z	SE	0	DB4 : SEG-E	PULL-DOWN
5	R1 ₁	I/O	H-Z	SF	0	DB4 : SEG-F	PULL-DOWN
6	R1 ₂	I/O	H-Z	SG	0	DB4 : SEG-G	PULL-DOWN
7	R1 ₃	I/O	H-Z		0	DB7 : 7SEG COM	PULL-DOWN
8	R2 ₀	I/O	H-Z		0	DB2 : DOT DP	PULL-DOWN
9	R2 ₁	I/O	H-Z		0	DB3 : DOT COM	PULL-DOWN
10	R2 ₂	I/O	H-Z	DP	0	DB5 : 7SEG DP	PULL-DOWN
11	R2 ₃	I/O	H-Z	ID	0	DB5 : 7SEG ID	PULL-DOWN
12	RA ₀	I	I	MODR	I	MODE RETURN	PULL-UP
13	RA ₁	I	I	CSFR	I	CLEAR, FEED, SWITCH RETURN	PULL-UP
14	R3 ₀	I/O	H-Z	KEX0	0	KEY EXCHANGE0	
15	R3 ₁	I/O	H-Z	KEX1	0	KEY EXCHANGE1	
16	R3 ₂	I/O	H-Z	NU	0	GND	
17	R3 ₃	I/O	H-Z	NU	0	GND	
18	R5 ₀	I/O	I	ST0	0	KEY SCAN ST0	
19	R5 ₁	I/O	I	ST1	0	KEY SCAN ST1	
20	R5 ₂	I/O	I	ST2	0	KEY SCAN ST2	
21	R5 ₃	I/O	I	ST3	0	KEY SCAN ST3	
22	R6 ₀ /INT0	I/O	I	POFF	I	P-OFF	
23	R6 ₁ /INT1	I/O	I	STOP	I	STOP	PULL-UP
24	R6 ₂ /INT2	I/O	I	DDIG	0	+5V	
25	R6 ₃ /INT3	I/O	I	DCS	0	DOT DISPLAY CONT./CS	
26	Vcc			VCC		+5V	
27	R4 ₀ /SCK	I/O	I	SCR	I	SCK	
28	R4 ₁ /SI	I/O	I	HTS	I	HTS	
29	R4 ₂ /S0	I/O	I	STH	0	STH	
30	R4 ₃ /PWM	I/O	I	SDISP	I	+5V	
31	R7 ₀ /BUZZ	I/O	I	BUZZ	0	BUZZER	
32	R7 ₁ /SCK2	I/O	I	DSCK	0	DOT DISP CONT. SCK	
33	R7 ₂ /SI2	I/O	I	SRES	0	SYSTEM RESET	PULL-DOWN

Pin No.	Port	I/O	RESET State	Signal name	I/O	Notes	PULL-UP -DOWN
34	R7 ₃ /S02	I/O	0	DS0	0	DOT DISP CONT. S0	
35	R8 ₀	I/O	0	SHEN	0	SHEN	
36	R8 ₁	I/O	0	KRQ	0	KEY REQUEST	
37	R9 ₀	I	I	KR0	I	KEY RETURN 0	
38	R9 ₁	I	I	KR1	I	KEY RETURN 1	
39	R9 ₂	I	I	KR2	I	KEY RETURN 2	
40	R9 ₃	I	I	KR3	I	KEY RETURN 3	
41	RESET	I	I	CKDCR	I	CKDC IV RESET	
42	OSC2					4.19 MHz X'tal	
43	OSC1						
44	GND					GND	
45	CL1					32.768 KHz OSC	
46	CL2						
47	TEST	I	I	VCKDC		5V	
48	D0	I/O	H-Z	G1	0	7 SEG DIG 1	PULL-DOWN
49	D1	I/O	H-Z	G2	0	7 SEG DIG 2	PULL-DOWN
50	D2	I/O	H-Z	G3	0	7 SEG DIG 3	PULL-DOWN
51	D3	I/O	H-Z	G4	I	7 SEG DIG 4	PULL-DOWN
52	D4	I/O	H-Z	G5	0	7 SEG DIG 5	PULL-DOWN
53	D5	I/O	H-Z	G6	0	7 SEG DIG 6	PULL-DOWN
54	D6	I/O	H-Z	G7	0	7 SEG DIG 7	PULL-DOWN
55	D7	I/O	H-Z	G8	0	7 SEG DIG 8	PULL-DOWN
56	D8	I/O	H-Z	G9	0	7 SEG DIG 9	PULL-DOWN
57	D9	I/O	H-Z	G10	0	7 SEG DIG 10	PULL-DOWN
58	D10	I/O	H-Z	NU	0		PULL-DOWN
59	D11	I/O	H-Z	NU	0		
60	D12	I/O	H-Z	NU	0		
61	D13	I/O	H-Z	NU	0		
62	D14	I/O	H-Z	NU	0		
63	D15	I/O	H-Z	NU	0		
64	R0 ₆	I/O	H-Z	SA	0	DB4 : SEG-A	PULL-DOWN

NOTE 3: Pull-up/down in the table indicates that the lines concerned require external pull-up/down resistance.

2-4. TPRC1 (F258024PC)

1) General

TPRC1 is the LSI circuit of the peripheral circuits of the microcomputer required for thermal printer control.

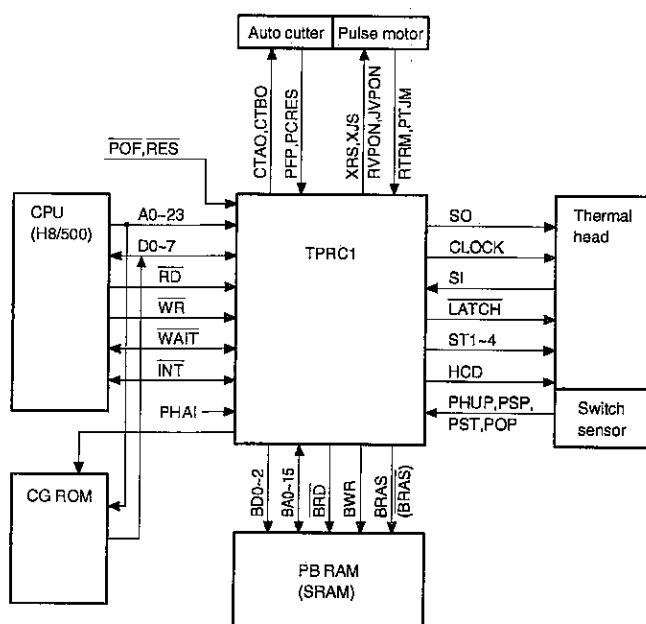


Fig. 2-6

The CPU is designed for use with H8/500. The bus I/F, however, is not restricted to the design concept.

The printer is designed mainly for use with PR-58. However, the thermalhead composition (the dot number and the block number) is rather flexible.

1. Auto cutter (Option)
2. Pulse motor
3. Thermalhead
4. Switch

2) Pin configuration

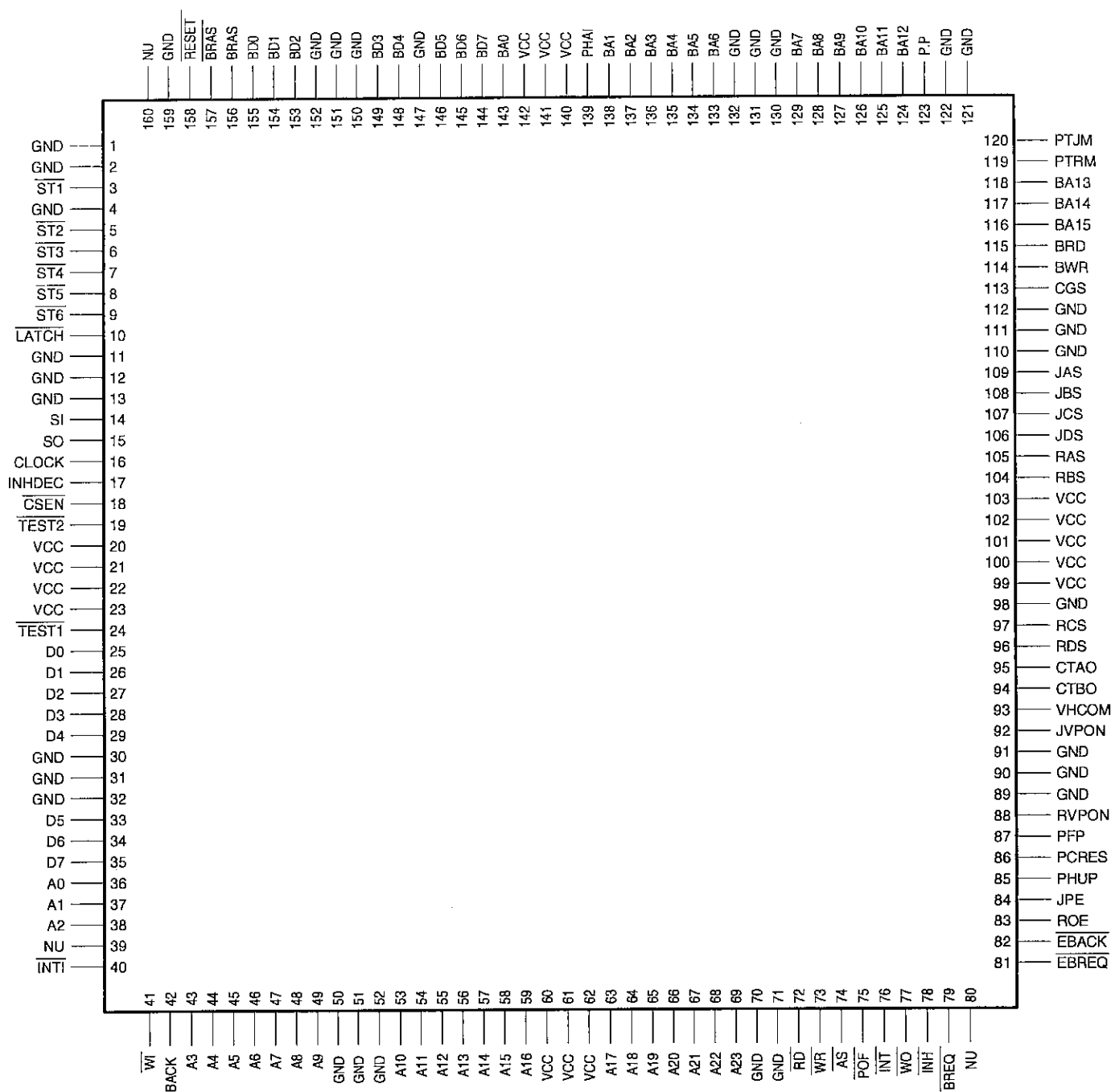
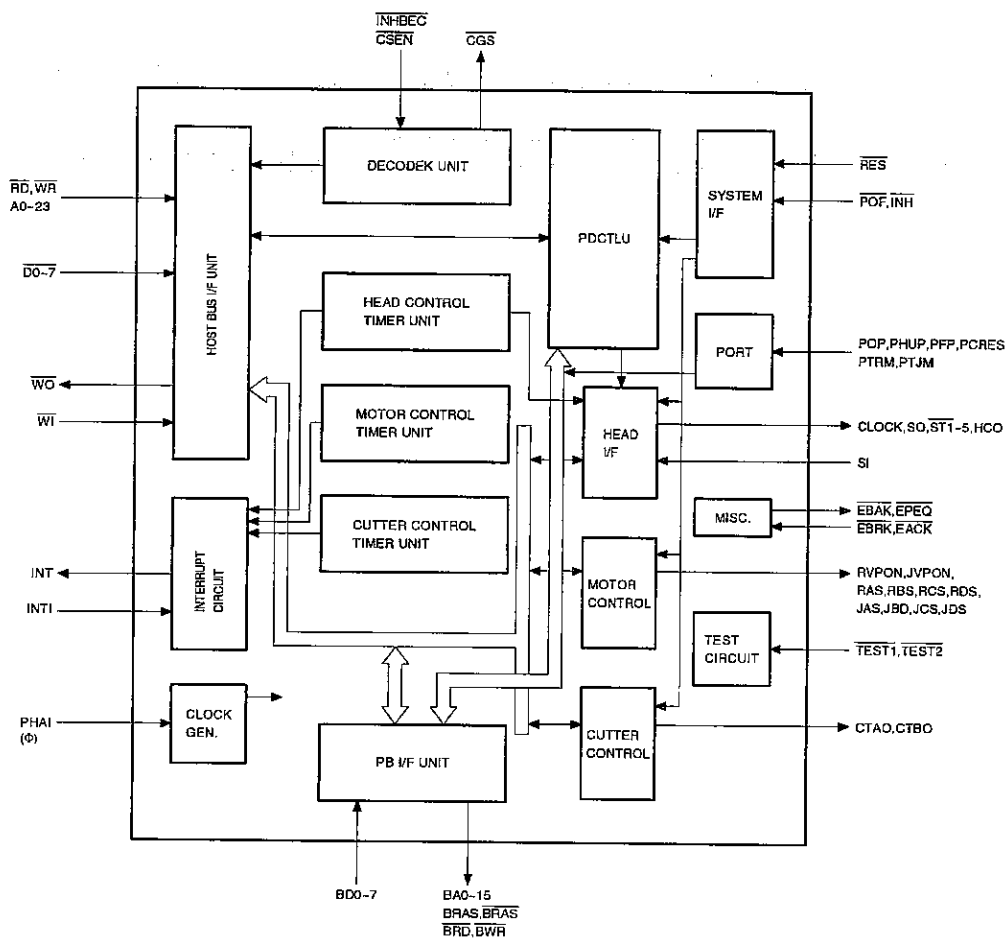


Fig. 2-7

3) Block diagram



TPRC1 BLOCK DIAGRAM

Fig. 2-8

3) Pin description

Pin No.	Signal name	In/Out	Function
1	GND	—	GND
2	GND	—	GND
3	ST1	O	Head drive strobe signal 1
4	GND	—	GND
5	ST2	O	Head drive strobe signal 2
6	ST3	O	Head drive strobe signal 3
7	ST4	O	Head drive strobe signal 4
8	ST5	O	NU
9	ST6	O	NU
10	LATCH	O	Head latch signal
11	GND	—	GND
12	GND	—	GND
13	GND	—	GND
14	SI	I	Data return line, thermalhead -- TPRC1
15	SO	O	Send data from TPRC1 to thermalhead Data from PB-RAM or zero data are outputted at the falling of CLOCK signal.

Pin No.	Signal name	In/Out	Function
16	CLOCK	O	Thermalhead CLOCK signal SO is outputted at the edge of I Å O, and is taken at the edge of o Å I.
17	INHDEC	I	GND
18	CSEN	I	GND
19	TEST2	I	+5V internal counter timer test pin
20	Vcc	—	+5V
21	Vcc	—	+5V
22	Vcc	—	+5V
23	Vcc	—	+5V
24	TEST1	I	+5V internal counter timer test pin
25	D0	I/O	Data bus 0: Internal register, print buffer data IO
26	D1	I/O	Data bus 1: Internal register, print buffer data IO
27	D2	I/O	Data bus 2: Internal register, print buffer data IO
28	D3	I/O	Data bus 3: Internal register, print buffer data IO

Pin No.	Signal name	In/Out	Function
29	D4	I/O	Data bus 4: Internal register, print buffer data IO
30	GND	—	GND
31	GND	—	GND
32	GND	—	GND
33	D5	I/O	Data bus 5: Internal register, print buffer data IO
34	D6	I/O	Data bus 6: Internal register, print buffer data IO
35	D7	I/O	Data bus 7: Internal register, print buffer data IO
36	A0	I	Address bus 0
37	A1	I	Address bus 1
38	A2	I	Address bus 2
39	TPRCRQ2	—	Request signal
40	INTI	I	+5V
41	WI	I	+5V
42	BACK	I	BACK
43	A3	I	Address bus 3
44	A4	I	Address bus 4
45	A5	I	Address bus 5
46	A6	I	Address bus 6
47	A7	I	Address bus 7
48	A8	I	Address bus 8
49	A9	I	Address bus 9
50	GND	—	GND
51	GND	—	GND
52	GND	—	GND
53	A10	I	Address bus 10
54	A11	I	Address bus 11
55	A12	I	Address bus 12
56	A13	I	Address bus 13
57	A14	I	Address bus 14
58	A15	I	Address bus 15
59	A16	I	Address bus 16
60	Vcc	—	+5V
61	Vcc	—	+5V
62	Vcc	—	+5V
63	A17	I	Address bus 17
64	A18	I	Address bus 18
65	A19	I	Address bus 19
66	A20	I	Address bus 20
67	A21	I	Address bus 21
68	A22	I	Address bus 22
69	A23	I	Address bus 23
70	GND	—	GND
71	GND	—	GND
72	RD	I	Read strobe signal: Gate enable of data bus D0 - D7 tri-state buffer
73	WR	I	Write strobe signal: Write enable into the internal register and the print buffer.
74	AS	I	AS
75	POF	I	Power off signal

Pin No.	Signal name	In/Out	Function
76	INT	O	Interrupt signal
77	WO	O	Wait request signal to the CPU
78	INH	I	Head drive inhibit
79	BREQ	O	Bus request to CPU
80	—	—	NU
81	EBREQ	I	Bus request from option
82	EBACK	O	Bus acknowledge to option
83	RPE	I	Receipt paper empty
84	JPE	I	Journal paper empty
85	PHUP	I	Printer head up
86	PCRES	I	Auto cutter unit reset signal input
87	PFP	I	Auto cutter unit FP signal input
88	RVPON	O	Receipt side paper feed pulse motor common power control signal
89	GND	—	GND
90	GND	—	GND
91	GND	—	GND
92	JVPON	O	Journal side paper feed pulse motor common power control signal (Not use)
93	VHCOM	O	Head drive common power control
94	CTBO	O	Cutter motor control signal
95	CTAO	O	Cutter motor control signal
96	RDS	O	Receipt side paper feed pulse motor drive signal, phase D
97	RCS	O	Receipt side paper feed pulse motor drive signal, phase C
98	GND	—	GND
99	Vcc	—	+5V
100	Vcc	—	+5V
101	Vcc	—	+5V
102	Vcc	—	+5V
103	Vcc	—	+5V
104	RBS	O	Receipt side paper feed pulse motor drive signal, phase B
105	RAS	O	Receipt side paper feed pulse motor drive signal, phase A
106	JDS	O	Journal side paper feed pulse motor drive signal, phase D
107	JCS	O	Journal side paper feed pulse motor drive signal, phase C
108	JBS	O	Journal side paper feed pulse motor drive signal, phase B
109	JAS	O	Journal side paper feed pulse motor drive signal, phase A
110	GND	—	GND
111	GND	—	GND
112	GND	—	GND
113	CGS	O	NU
114	BWR	O	PB-RAM write strobe signal
115	BRD	O	PB-RAM read strobe signal
116	BA15	O	NU
117	BA14	O	Address 14 for PB-RAM
118	BA13	O	Address 13 for PB-RAM
119	PTRM	I	NU

Pin No.	Signal name	In/Out	Function
120	PTJM	I	NU
121	GND	—	GND
122	GND	—	GND
123	POPI	O	GND
124	BA12	O	Address bus 12 for PB-RAM
125	BA11	O	Address bus 11 for PB-RAM
126	BA10	O	Address bus 10 for PB-RAM
127	BA9	O	Address bus 9 for PB-RAM
128	BA8	O	Address bus 8 for PB-RAM
129	BA7	O	Address bus 7 for PB-RAM
130	GND	—	GND
131	GND	—	GND
132	GND	—	GND
133	BA6	O	Address bus 6 for PB-RAM
134	BA5	O	Address bus 5 for PB-RAM
135	BA4	O	Address bus 4 for PB-RAM
136	BA3	O	Address bus 3 for PB-RAM
137	BA2	O	Address bus 2 for PB-RAM
138	BA1	O	Address bus 1 for PB-RAM
139	PHAI	I	TPRC1 clock input pin
140	Vcc	—	+5V
141	Vcc	—	+5V
142	Vcc	—	+5V
143	BA0	O	Address bus 0 for PB-RAM
144	BD7	I/O	Data bus 7 for PB-RAM
145	BD6	I/O	Data bus 6 for PB-RAM
146	BD5	I/O	Data bus 5 for PB-RAM
147	GND	—	GND
148	BD4	I/O	Data bus 4 for PB-RAM
149	BD3	I/O	Data bus 3 for PB-RAM
150	GND	—	GND
151	GND	—	GND
152	GND	—	GND
153	BD2	I/O	Data bus 2 for PB-RAM
154	BD1	I/O	Data bus 1 for PB-RAM
155	BD0	I/O	Data bus 0 for PB-RAM
156	BRAS	O	PB-RAM chip select: Active HIGH
157	BRAS	O	PB-RAM chip select: Active LOW
158	RESET	I	TPRC1 reset signal
159	GND	—	GND
160	NU	—	GND

3. Clock generator

1) CPU (HD64151010FX)

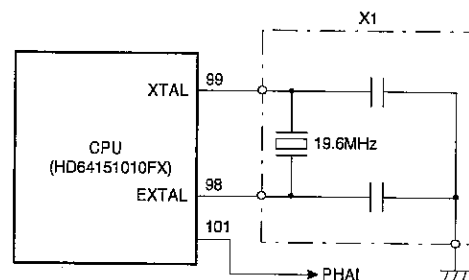
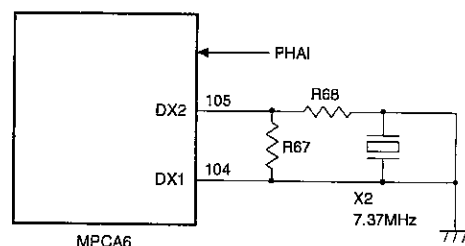


Fig. 3-1

Basic clock is supplied from a 19.6MHz ceramic oscillator. The CPU contains an oscillation circuit from which the basic clock is internally driven. If the CPU was not operating properly, the signal does not appear on this line in most cases.

2) MPCA6



X2: 7.37 MHz is IR communication clock.

3) HD404728A91FS CKDC6 oscillation circuit (Display-PWB)

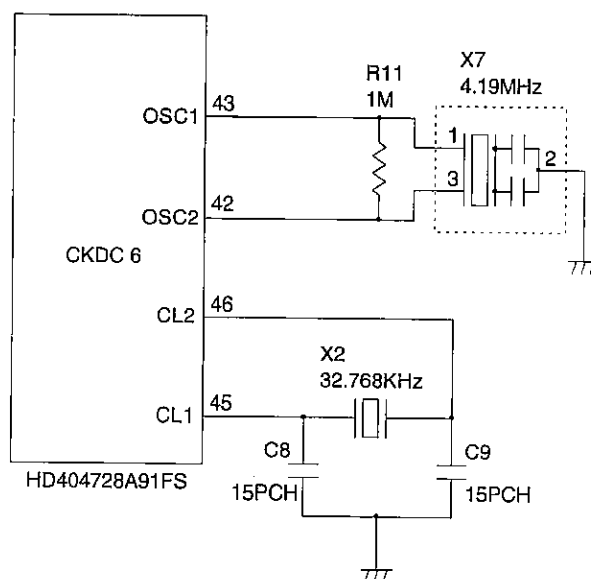


Fig. 3-2

Two oscillators are connected to the CKDC6. The main clock X1 generates 4.19MHz which is used during power on. When power is turned off, the CKDC6 goes into the standby mode and the main clock stops. The sub-clock X2 generates 32.768KHz which is primarily used to update the internal RTC (real time clock). During the standby mode, it keeps oscillating to update the clock and monitoring the power recovery.

4. Reset (POFF) circuit

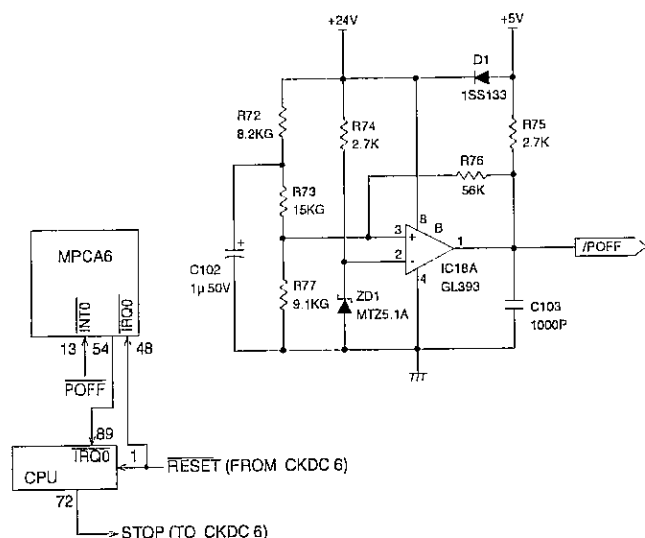
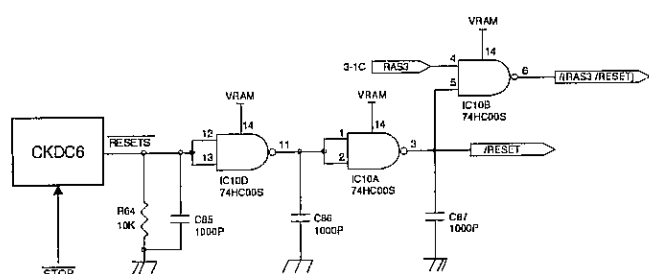


Fig. 4-1

In order to prevent memory loss at a time of power off and power supply failure of the ECR, the power supply condition is monitored at all times. When a power failure is met, the CPU suspends the execution of the current program and immediately executes the power-off program to save the data in the CPU registers in the external S-RAM with the signal **STOP** forced low to prepare for the power-off situation. The signal **STOP** is supplied to the CKDC6 as signal **RESET** to reset the devices.

This circuit monitors +24V supply voltage.

The voltage at the (-) pin of the comparator GL393 is always maintained to 5.1V by means of the zener diode ZD1, while +24V supply voltage is divided through the resistors R72, R73, and R77, and is applied to the (+) pin. When normal +24V is in supply, 6.8V is supplied to the (+) pin, therefore, signal **POFF** is at a high level. When +24V supply voltage decreases due to a power off or any other reason, the voltage at the (+) pin also decreases. When +24V supply voltage drops, the voltage at the (+) pin drops below +5.1V, which causes **POFF** to go low, thus predicting the power-off situation.



The **STOP** signal from the CPU is converted into the **RESETS** signal by the CKDC6.

The **RESETS** signal from the CKDC6 is converted into the **RESET** signal at the gate backed-up by the VRAM power, performing the system reset.

5. Memory control

1) Memory map

① All range memory map

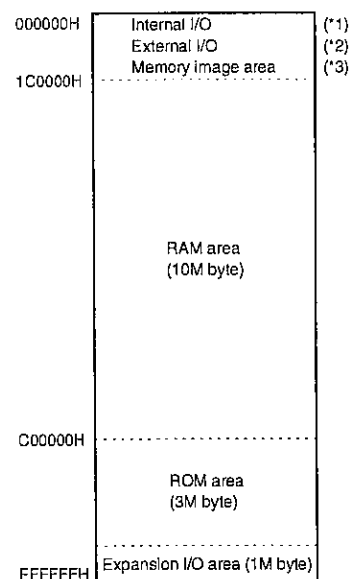


Fig. 5-1

- (*1) "Internal I/O" means the registers in the H8/510.
- (*2) "External I/O" means the base system I/O area to be addressed in page 0.
- (*3) "Memory image area" means the lower 32KB of ROM area which is projected to 000000H ~ 007FFFH for allowing reset start and other vector addressing, or the lower 32KB of ROM area which is projected to 008000H ~ 00FE7FH for allowing 0 page addressing of work RAM area.
- (*4) "Expansion I/O" means expansion I/O device area which is addressed to area other than page 0.

② 0 page memory map

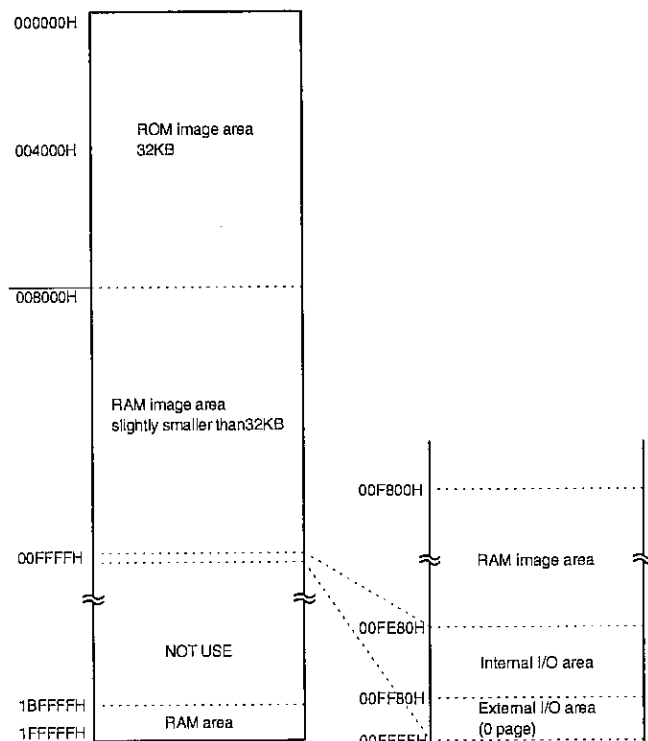


Fig. 5-2

- ROM image area: Image is formed in ROM area address C00000H to C07FFFH. This area is identical to IPL ROM area which will be separately developed.
- RAM image area: Image is formed in RAM area address 1F0000H to 1F7E7FH. (*Note)

* Note: Image can be formed in lower 32KB of RAS2.

③ ROM area memory map

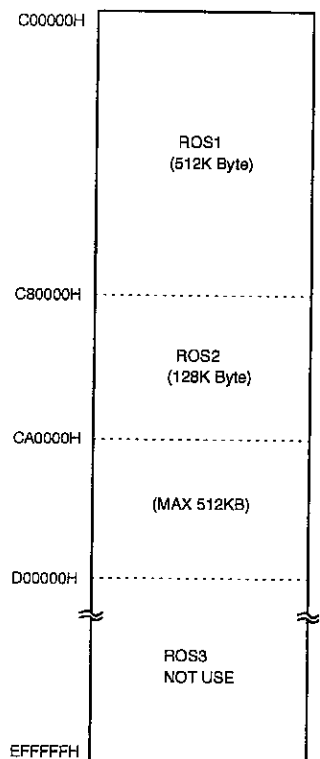


Fig. 5-3

④ RAM area memory map

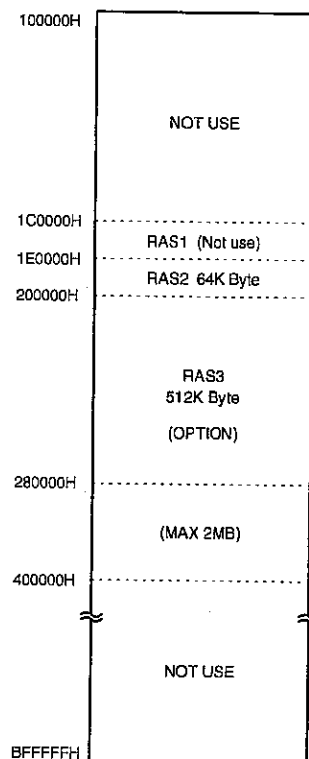


Fig. 5-4

* Note: RAS2 signal is formed as OR in the image area of 0 page. (lower 32KB).

⑤ I/O area memory map

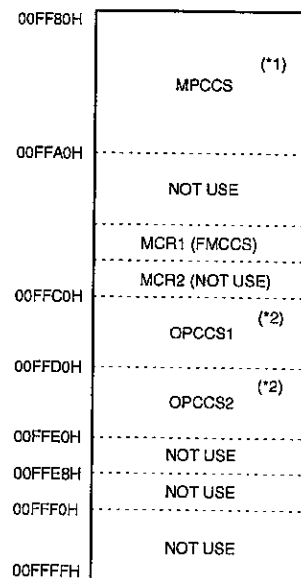


Fig. 5-5

* Note 1: MPCCS signal is the base signal for MPCA6 internal register decoding, and does not exist as an internal signal.

* Note 2: OPCCS1 and OPCCS2 signals are decoded in the OPC (option peripheral controller) using the base signal OPTCS for option decoding. They do not exist as external signals.

2) Block diagram

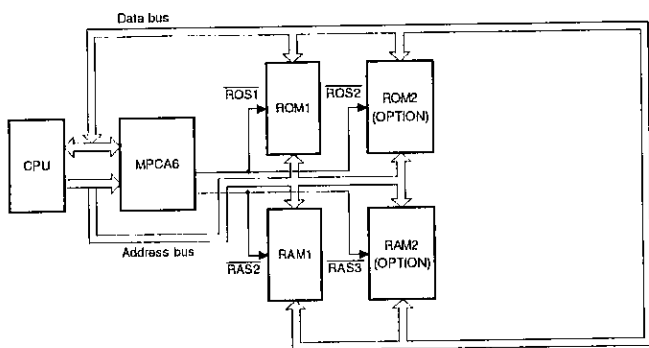


Fig. 5-6

① ROM control

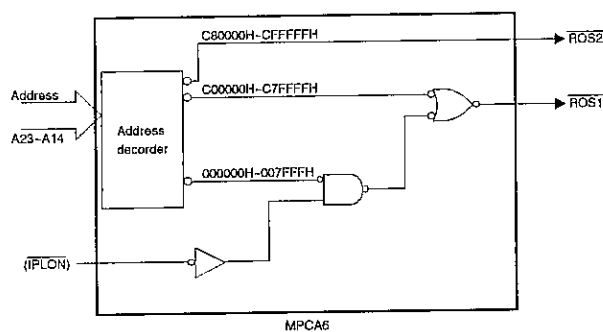


Fig. 5-7

IPLON: IPL board detection signal incorporated in the option slot.
Note used in the ER-A495PN/PF. (Not used)

Access is performed with two ROM chip select signals $\overline{ROS1}$ and $\overline{ROS2}$, which decode 512KB address area respectively to access max. 4MB ROM.

② RAM control

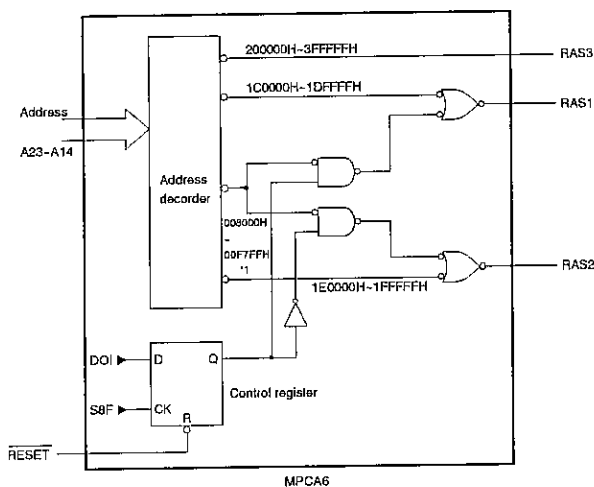


Fig. 5-8

Access is performed with two RAM chip select signals, RAS2 and RAS3. The control register in MPCA6 allows selection of page image memory area. (RAS1 is selected for initializing.)

* : For 0 page image area, selection between RAS2 and RAS3 can be made with the control register. The 0 page control register performs initializing at the timing of no stack process immediately after resetting.

6. SSP circuit

1) Block diagram

This is the circuit employed to do the Special Service Preset (SSP).
(Block diagram)

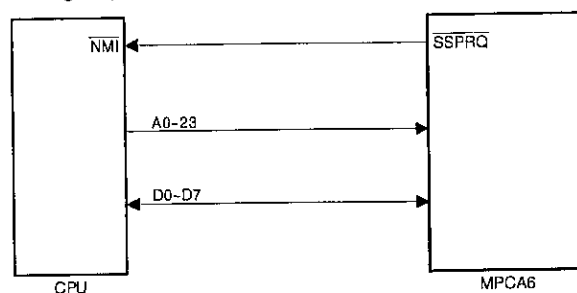


Fig. 6-1

(MPCA6 block diagram)

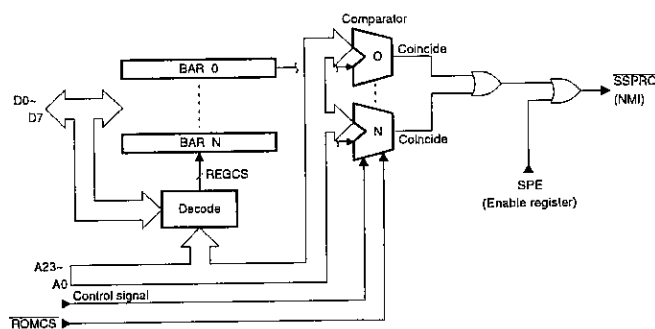


Fig. 6-2

As the address detection system, the break address register comparison system is employed though the mapping system was employed in the conventional monitor RAM. The address register located in MPCA is always compared with the system address bus to monitor and generate NMI signal at a synchronized timing and to go to NMI exception process.

In the exception process routine service routine, the entry address is checked to go to SSP sub routine.

Entry to the break address register (BAR) is performed through address FFFF00H or later decoded in MPCA6.

2) SSP register

The break address register (BAR) is accessed through direct address of FFFF00H-FFFFFFFH. Entry number is 32 entry.

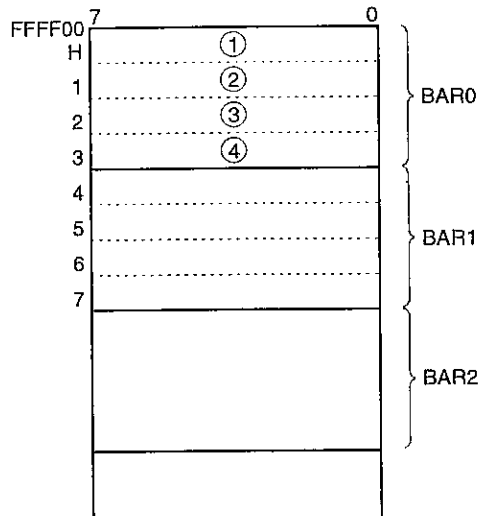


Fig. 6-3

Each BAR is composed of 4 byte address. Bit composition is as follows:

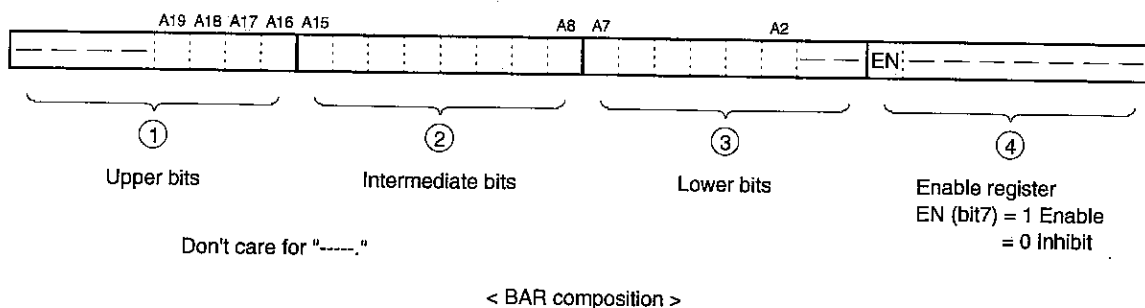


Fig. 6-4

④ is the enable register. The entry registers of the break address are assigned to ①, ②, and ③. Each bit of address corresponds to each bit position, writing to ①, ②, and ③ is performed without shifting. The corresponding area is 1MB space of ROS1 and ROS2.

3) SSP register access method

Access to SSP break address register is performed through the temporary register as shown below:

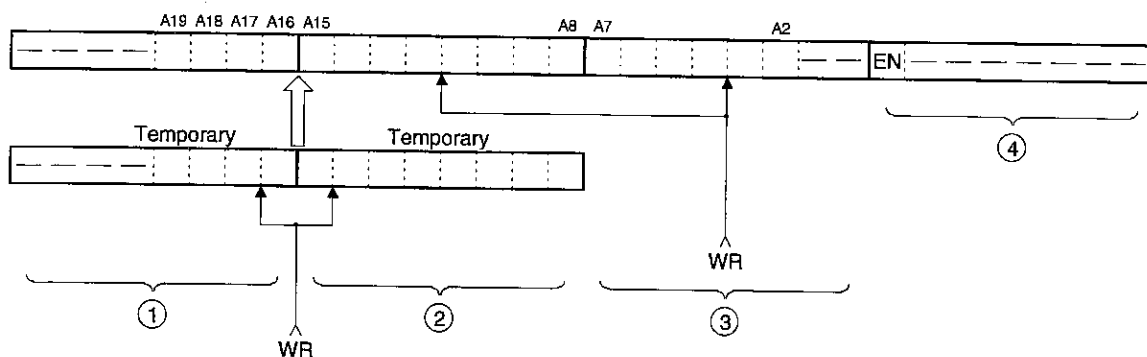


Fig. 6-5

Enable flags can be accessed individually.

Though enable register ④ can be accessed individually, writing to brake address registers ① and ② is performed at the same time as writing to brake address register ③ through the temporary register. Therefore, set ① and ② to temporary, then write into ③ at last. Since the temporary register is commonly used by BAR sets, the following register setting is performed after completion of setting of each break address register.

③ SSP control method

Access to the enable register and the brake address register is only possible when writing to them from the CPU.

bit 7	6	5	4	3	2	1	0
0	0	0	CMP4	CMP3	CMP2	CMP1	CMP0 (FFFFFFH)

Information on which brake register the SSP brake is detected in is read as binary data by reading address FFFFFFFH (*1).
Used in an expanded register.

Normally is a reserve bit. When reading, fixed to 0.

If there are 32 break registers, binary expression is made with the above 5 bits, and 0th is "00000₅" and 31st is "11111₅."

When detected simultaneously by two or more break registers, one with the smaller BAR number is read as binary data.

The brake signals (NMI) and the above detection data (CMP0~4) are held until the above detection data are read. So read should be made in the NMI sub routine. (Clear by FFFFFFFH read.)

* 1: FFFFFFFH is not full decoded. (FFFFFF0H~FFFFFFFH). Therefore, unnecessary read access in parentheses should not be performed.

7. PRINTER control circuit

1)Block diagram

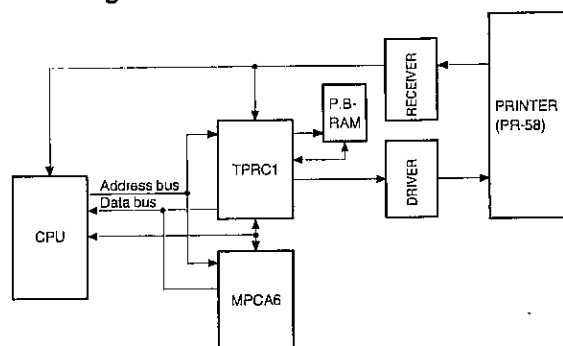
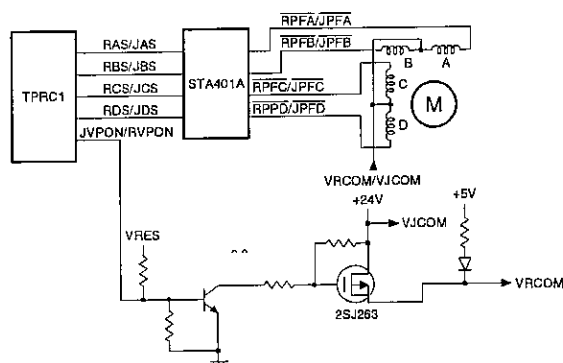


Fig. 7-1

- The thermal printer (PR-58) is controlled by the thermal printer controller (TPRC1). The PB-RAM connected to TPRC1 serves as a print data buffer.

2) Paper feed circuit



- A pulse motor is used as the paper feed motor.
 - Drive sequence of the pulse motor is as follows:
- Receipt feed motor: The motor rotates counterclockwise.

Step No.	Phase			
	A	B	C	D
1	ON	OFF	ON	OFF
2	ON	OFF	OFF	ON
3	OFF	ON	OFF	ON
4	OFF	ON	ON	OFF

Journal feed motor: The motor rotates clockwise.

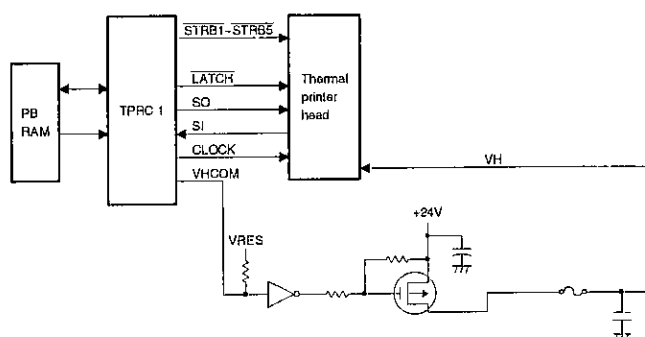
Step No.	Phase			
	A	B	C	D
1	ON	OFF	OFF	ON
2	ON	OFF	ON	OFF
3	OFF	ON	ON	OFF
4	OFF	ON	OFF	ON

Note 1: ON = Conducting
OFF = Not conducting

Note 2: Step No. is performed by the internal process of TPRC1.

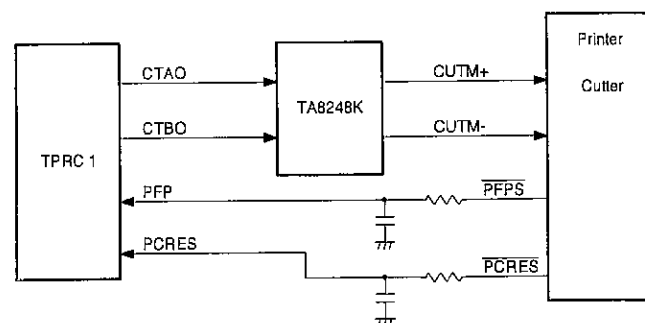
- When the motor is locked, the circuit is connected to the CPU through MPC66.

3) Print circuit



4) Cutter circuit

- The PR-58M does not have auto cutter.



- The cutter motor is conducted by CTAO signal from TPRC1 to drive the cutter blade. After setting paper, the reset signal (PCRES) and the full-cut/partial-cut position signal are returned to TPRC1, and the cutter motor is rotated reversely by CTBO signal from TPRC1 to return the cutter blade to its home position.

8. Drawer drive circuit

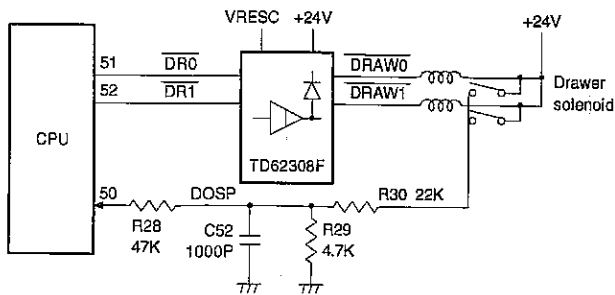


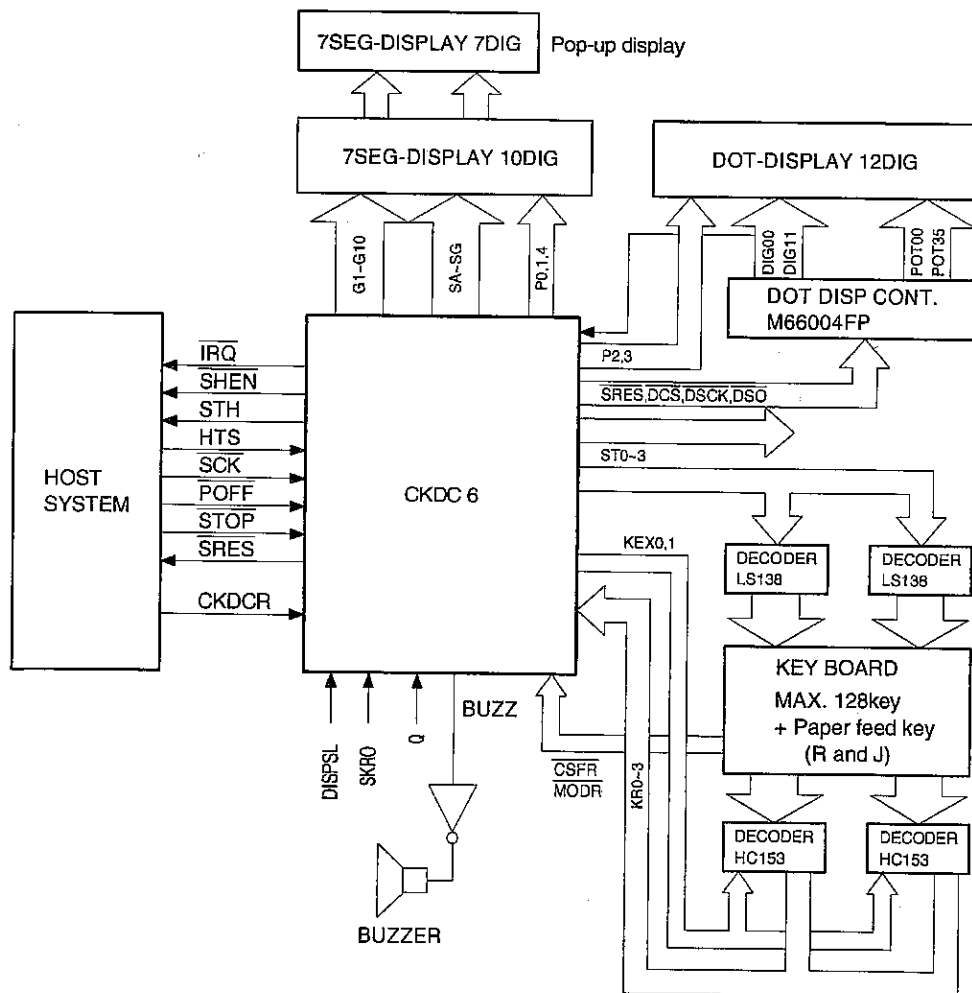
Fig. 8-1

The drawer is directly supported by the CPU. No action starts when the power supply is not steady as the output stage of the driver is pulled VP by VRES signal.

Drawer open and close is sensed with the microswitch provided in the drawer whose signal is level converted with R74 and R73 and directly read by the CPU.

9. Key, display, timer, buzzer controls

The keys, switches, displays, timer/calendar, and buzzer are controlled by the CKDC-6 on the display PWB.



Block diagram
Fig. 9-1

1) Power on/off sequence

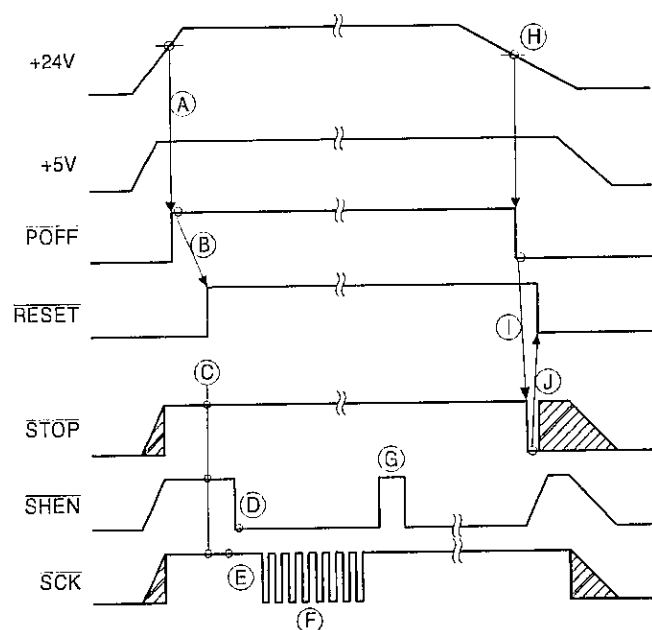


Fig. 9-2

Hatched area indicates logic unstable.

<At power on>

When +24V power rises, the signal $\overline{\text{PÖFF}}$ is forced high (A), by which time the +5V supply becomes stable. The CKDC6 monitors the state of $\overline{\text{PÖFF}}$ while updating the timer/calendar in the low power standby mode, and when the high state of $\overline{\text{PÖFF}}$ is detected, the system reset signal ($\overline{\text{RESET}}$) is set high (B), by which time the output lines $\overline{\text{STOP}}$ and $\overline{\text{SCK}}$ of the CPU and MPCA6 have been initialized to high, respectively (C). Thereafter, the CKDC6 sets $\overline{\text{SHEN}}$ active (low) (D) to notify the CPU of the command/data communication ready state. One byte data/command can be transferred with eight $\overline{\text{SCK}}$ pulses (F). When one byte has been transferred with eight $\overline{\text{SCK}}$ pulses, the CKDC6 sets $\overline{\text{SHEN}}$ high to initiate internal processing. After completion of the internal processing, when the next byte transfer becomes ready, the CKDC6 sets $\overline{\text{SHEN}}$ back to a low state to wait for the next byte transfer (G). Thereafter, the $\overline{\text{SHEN}}$ and $\overline{\text{SCK}}$ timing described above is repeated to carry on the communication.

<At power off>

When +24V power drops, $\overline{\text{PÖFF}}$ goes low (H). A low on the $\overline{\text{PÖFF}}$ line causes a low level interrupt request which is sent the $\overline{\text{IRQ0}}$ pin of the CPU. Within a maximum of 10msec of the low level $\overline{\text{IRQ0}}$ input, the CPU performs software processing necessary for power-off, after which the $\overline{\text{STOP}}$ output is set low (I). When $\overline{\text{STOP}}$ goes low, the CKDC6 sets $\overline{\text{RESET}}$ low to reset the whole system (J). And, the +5V supply is held at 4.75V or higher voltage, after which the voltage drops to a level that the logic circuit does not operate.

2) Key and switch scanning

Strobes ST0 ~ ST3 are decoded on the keyboard by two 74LS138 3-to-8 decoders to generate 16 strobe signals of S15 ~ S0. The key matrix consists of 16 strobe lines and 16 returns lines of KR0A, KR1A, KR2A, KR3A, KR0B, KR1B, KR2B, and KR3B. To minimize interfacing lines between the CKDC6 and the keyboard unit, two multiplexers (74HC153) are used to multiplex signals by the timing controlled with the signals KEX0 and KEX1 which are sent to the CKDC6 on the return lines of KR0 ~ KR3.

Timing ST

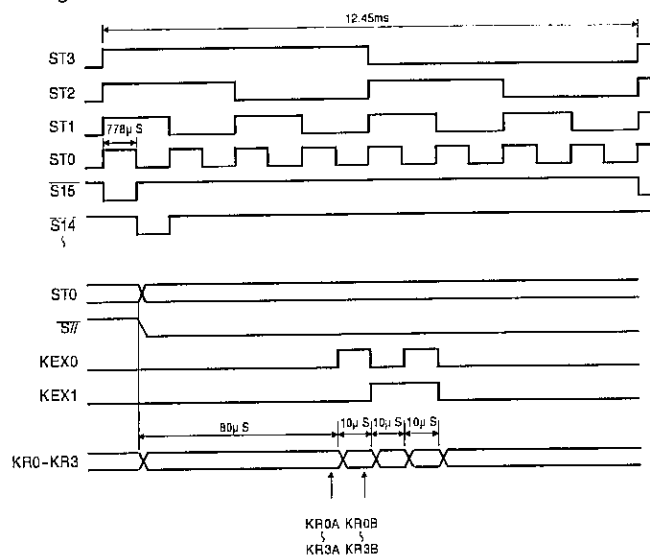


Fig. 9-3

The mode switch is provided with a special return line $\overline{\text{MODR}}$, apart from the above return lines.

In the same manner, the clerk, paper feed key (J/R), and receipt on/off switches use CFSR as the return line.

3) DISPLAY CONTROL

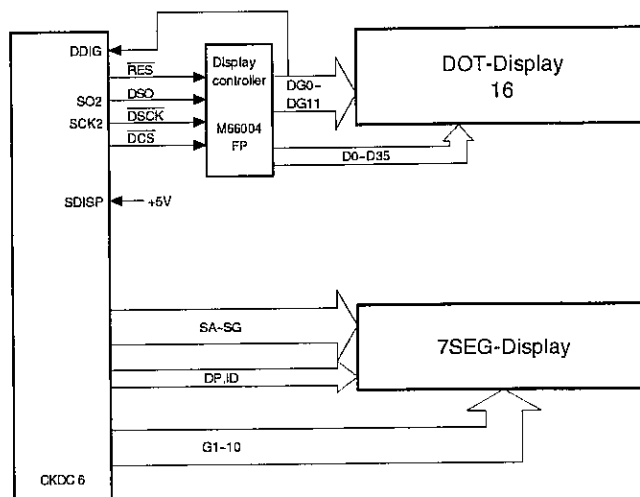


Fig. 9-4

CKDC6 directly drives the 7-segment display unit and the dot display is driven via M66004FP.

<7-segment display>

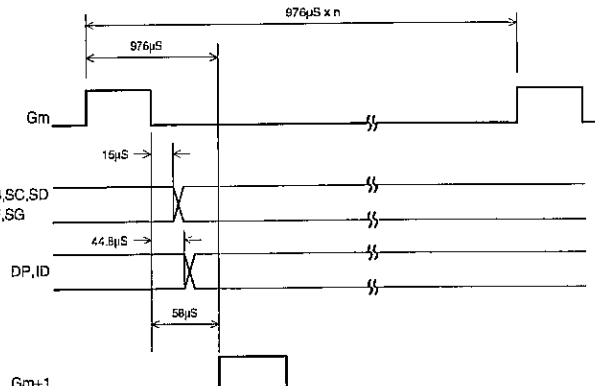


Fig. 9-5

<Dot display>

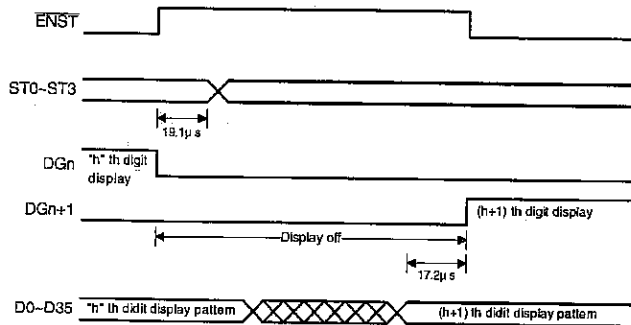


Fig. 9-6

IMPORTANT:

The CKDC6 lines are not high voltage resistive ports. Damage may occur to the CKDC6 if lines are shorted carelessly when using oscilloscope probes.

• Dot matrix tube

A 4-bit binary output signals (ST0-ST3) from CKDC6 are converted into the digit drive signal (DG0-DG11) in the M66004FP.

<Dot display control>

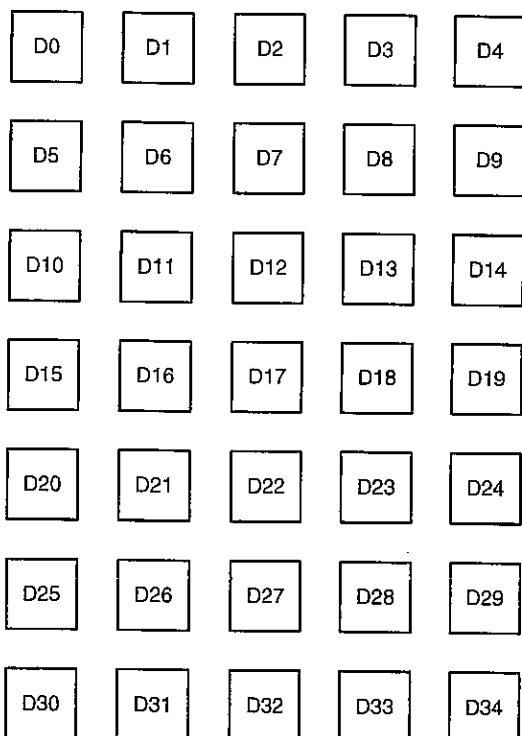
The CKDC6 controls the character segment (5 x 7) and the indicator of the dot display by using the controller (M66004FP) for dot display control.

① M66004FP/Dot display control signal

Signal name	Contents	Pin/Remark
DSO	Serial data output signal for M66004FP	C-MOS pin
D $\overline{\text{SCK}}$	Serial shift clock output signal for M66004FP	C-MOS pin. Requires to be pulled up
D $\overline{\text{CS}}$	Chip select output signal for M66004FP	C-MOS pin

D35

: Indicator



10. Power supply circuit

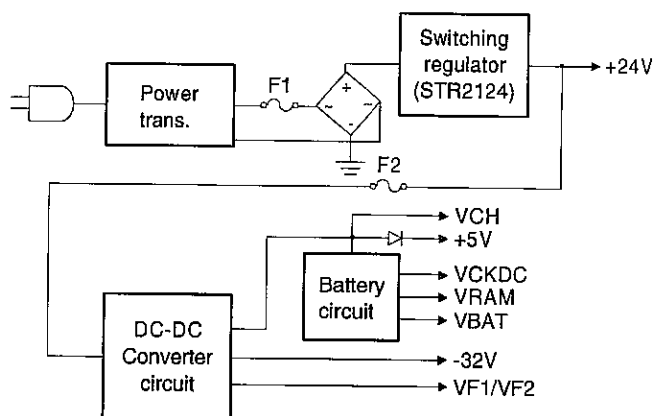


Fig. 10-1

+24V: Printer, solenoid power
+5V: VCC (Logic power)
VBAT: Battery charge
-32V: Display tube power
VF1, VF2: Display tube power (AC)
VRAM: Battery back-up power
VCKDC: CKDC-6 Back-up power
VCH: Fiscal memory unit

11. Switching regulator circuit

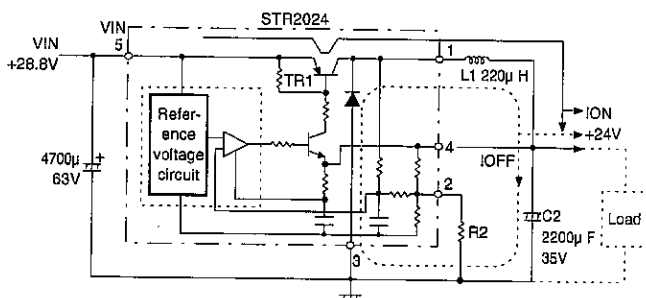


Fig. 11-1

By switching VIN (+28.8V) by the transistor TR1 within the STR2024, DC+24V supply is obtained through the LC network. Stable +24V is obtained by controlling on/off duty of TR1.

ION: Current when TR1 is on.

IOFF: Current when TR1 is off.

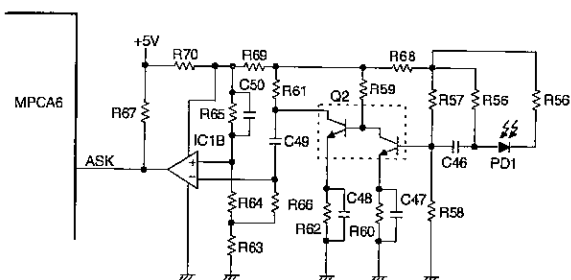
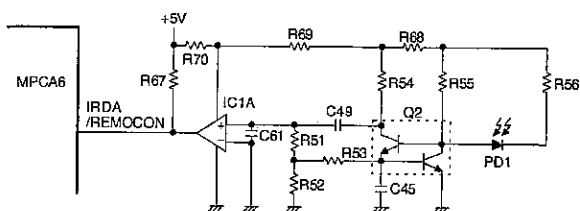
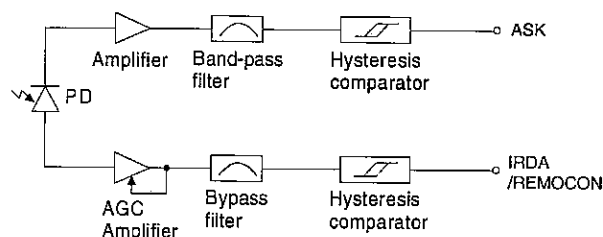
12. I/R communication circuit

- In the ER-A490, infra-red data transmission of the optical communication system is performed.

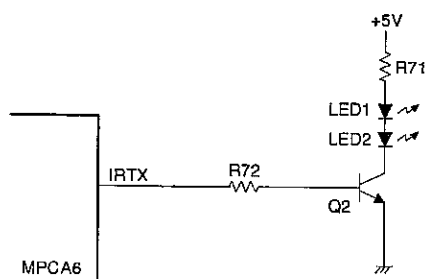
System	IRDA	ASK	REMOTE KEYBOARD
Carrier wave	950 nm	900 ~ 1050 nm	900 ~ 950 nm
Sub-carrier wave	(16 times of baud rate clock)	500 kHz \pm 10%	33 ~ 40 kHz
Modulation system	"0": HIGH level "1": LOW level Only around the center of the bit cycle in HIGH level, 3/16 of the bit cycle is set HIGH, and the rest is set LOW.	Pulse modulation: The pulse array of data code is modulated by the AM system. Primary modulation: The sub-carrier waveform is amplitude-modulated with this pulse array. Secondary modulation: With the sub-carrier waveform which was modulated in the primary modulation, infra-red rays are amplitude-modulated.	Pulse modulation: The pulse array is modulated by data codes in the PPM system. Primary modulation: The sub-carrier waveform is amplitude-modulated with this pulse array. Secondary modulation: With the sub-carrier waveform which was modulated in the primary modulation, infra-red rays are amplitude-modulated.
Modulated waveform	<p>The diagram illustrates the timing and modulation for IRDA, ASK, and Remote Keyboard communication. It includes UART data, Reverse UART, IRDA signal (16-divisions, 3/16 high), ASK signal (500KHz), and detailed Remote Keyboard timing (First time, Second time and later, Carrier waveform).</p> <p><Remote keyboard> Time is the value for 455kHz oscillation.</p> <p>First time: 58.5-76.5 ms, 108 ms, 108 ms, 9 ms, 4.5 ms, 13.5 ms, Custom Code 8 bits, Custom Code' 8 bits, Data Code 8 bits, Data Code 8 bits, 18 ms-36 ms, 58.5 ms-76.5 ms, 27 ms.</p> <p>Second time and later (Transmitted only when the key is depressed.): 9 ms, 11.25 ms, 2.25 ms, 0.56 ms.</p> <p>Carrier waveform: 8.77μs, 26.3μs, 9 ms or 0.56 ms. Carrier frequency...fc=fosc/12=38 kHz.</p>		
Baud rate	2.4 ~ 115.2 kbps	9.6 ~ 57.6 kbps (ZR-5000: 9600 bps)	—
Serial communication system	Start-stop synchronization system Data length: 8bit Parity: None Stop bit: 1	Start-stop synchronization system Data length: 8bit Parity: ODD Stop bit: 1	—
Transmission distance	About 0.75m: ECR to ECR Min. 0.65m	About 0.75m: ECR to ECR Min. 0.65m	About 1m

Reception circuit

The infra-red signals which was transmitted from the transmission unit through the air is received by the photo diode, and sent through the two-system circuit to the MPCA6, where they are modulated and inputted to the CPU.



Transmission circuit



With the IRTX signal from the MPCA6, Q2 is turned on/off to light LED1, 2. To strengthen the light intensity, two LED's are used.

CHAPTER 5. TEST FUNCTION

1. General

- 1) This diagnostic program has been developed for diagnosing machine functions in the field. The program is contained within the ER-A490.

The diagnostic program is stored in the external ROM which will be executed by the CPU (H8/510) which requires the following diagnostic operations:

- Proper power supply voltages are mandatory for logic circuits (+5V, VRAM, VCKDC, POFF, +12.5V, +24V).
- CPU input/output pins, CPU internal logic, CKDC6, MPCA6, TPRC1, system bus and common ROM/RAM must be working properly.

2. Operational procedure

To start the diagnostic program, you must enter the following command.

3-digit test item number → **[TL]** key in the SRV mode.

The key assignment must be properly set and the ROM and RAM must be operating properly to go into this mode. This is necessary because the control jumps to the program area in the SRV mode. A master reset must be performed before operating the ECR for the first time. After any option is installed, a program reset is required. When the master reset or program reset is performed, be sure to check the printout on the journal paper.

Master reset: Turn power on in the SRV' mode and change it to the SRV mode with the **[JF]** key pressed.

Journal print: MASTER RESET ***

Program reset: Turn power on in the SRV' mode and change it to the SRV mode.

Journal print: PRG. RESET ***

3. Test command list

With the SRV mode and the following command entry, the test starts.

Code	Description
100	Display test-1
101	Key, Clerk, and switch position code display
102	R/J printer test
104	Keyboard test
105	Mode switch test
106	Paper end sensor and near end sensor test
108	Calendar oscillator test
109	SSP test
110	Drawer open sensor test
111	Remote drawer open sensor test
116	Display test 2
117	I/R interface test: Checker side
118	I/R interface test: Tested machine side
119	CG print
120	Standard RAM test
130	Standard ROM test
151	A/D conversion check
200	Option RAM test: For ER-02RA
201	Option RAM test: For ER-03RA
400	Option ROM test: For ER-A49R2
600 - 604	Fiscal memory blank check (Not for field service use)
750 - 781	Fiscal memory unit read/write check (For field service use)
850 - 881	Fiscal memory unit read check
900 - 964	Fiscal memory dump (For field service use)

[1] Display test-1

- ① Key operation

100 → **[TL]**

- ② Functional description

The following is displayed:

Front display

DOT DISPLAY: **1 2 3 4 5 6 7 8 9 0 A B**

7-SEGMENT DISPLAY: **1.2.3.4.5.6.7.8.9.0.**

Operator display

4.5.6.7.8.9.0.

- ③ Check the following items:

- Check for proper activation of display elements.
- Check for blur, uneven illumination, and partial omission.

- ④ Test termination

Press any key. The test terminates with the test and message printed.

100
Test termination print

[2] Key, clerk, and switch position code display

- ① Key operation

101 → **[TL]**

DOT DISPLAY:

C L K s w K E Y S R V

7-SEGMENT DISPLAY:

○ ○ ○ ○ ○ ○ ○
Clerk code Key code

- ② Functional description

Key, clerk, and receipt switch codes are displayed.

- ③ Check the following items:

Change key and switch positions for proper display activation.

Clerk code: 1 hole clerk key (ER-A5CL)

000 (off state)

001 (Clerk 1)

002 (Clerk 2)

}

255 (Clerk 255)

MRS SW: 00 (ON state)

01 (OFF state)

Key code: --- (simultaneous two key)
depression, invalid entry)

KEY POSITION CODE

ER-A490 (Flat key) 15 x 8

↑R	↑J	022	030	038	046	054	062	070	078	086	094	102	110	118
007	014	021	029	037	045	053	061	069	077	085	093	101	109	117
006	013	020	028	036	044	052	060	068	076	084	092	100	108	116
005	012	019	027	035	043	051	059	067	075	083	091	099	107	115
004	011	018	026	034	042	050	058	066	074	082	090	098	106	114
003	010	017	025	033	041	049	057	065	073	081	089	097	105	113
002	009	016	024	032	040	048	056	064	072	080	088	096	104	112
001	008	015	023	031	039	047	055	063	071	079	087	095	103	111

④ Test termination

Change the MODE switch position other than SRV position to terminate the test. The test termination message is printed.



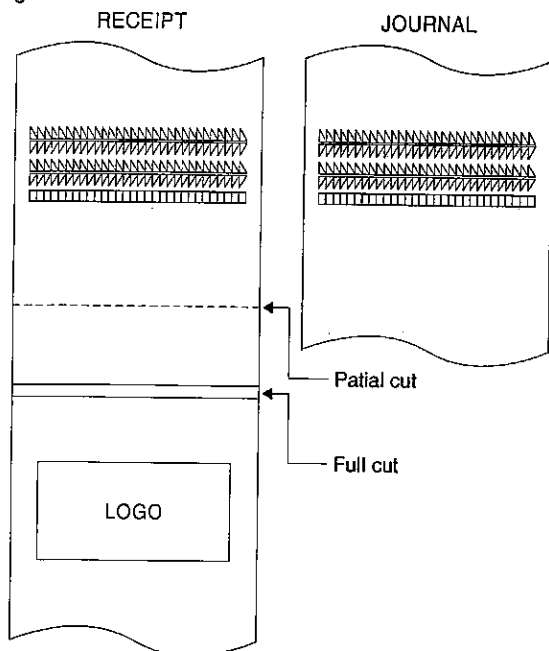
[3] R/J printer test

① Key operation

102 → **TL**

② Content

Five lines of special characters are printed as follows on the receipt and the journal regardless of receipt (ON/OFF) switch setting.



③ Check content

1. Check that the slanted lines of special characters are clearly printed.
2. Check that the characters are printed at a uniform density.
3. Check the paper feed operation and the logo print.
4. Check the partial cut and the full cut. (Only for the printer with auto cutter)

④ Termination

This check is terminated automatically.
The termination print is not performed.

[4] Keyboard test

① Key operation

XXXX104 → **TL**

XXXX: Sumcheck data

Standard key layout sumcheck data	
ER-A490	7449

② Details of test

Keyboard check is performed with the sum check data of key code.

For sum check data, data are inputted to the upper four digits before the diagnostics code. The data are compared with the added data which are added until the final key (TL) is pressed. If the data agree with the added data, the end print is made. If not, the error print is made.

The sum check data is obtained by totalizing all key hardware codes except for the (TL) key and converting the total into a decimal figure.

ER-A490 KEY HARDWARE CODE

1. SUM CHECK DATA = 0F+06+05+04+00+..... = 1D0E = 7449

↑R	↑J	0F	06	05	04	00	01	07	0B	0A	09	08	0C	0D
4F	46	45	44	40	41	42	43	47	4B	4A	49	48	4C	4D
3F	36	35	34	30	31	32	33	37	3B	3A	39	38	3C	3D
2F	26	25	24	20	21	22	23	27	2B	2A	29	28	2C	2D
1F	16	15	14	10	11	12	13	17	1B	1A	19	18	1C	1D
5F	56	55	54	50	51	52	53	57	5B	5A	59	58	5C	5D
6F	66	65	64	60	61	62	63	67	6B	6A	69	68	6C	6D
7F	76	75	74	70	71	TL	73	77	7B	7A	79	78	7C	7A

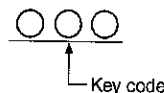
2. ALL KEY LAYOUT

↑R	↑J	0F	06	05	04	00	01	07	0B	0A	09	08	0C	0D
4F	46	45	44	40	41	42	43	47	4B	4A	49	48	4C	4D
3F	36	35	34	30	31	32	33	37	3B	3A	39	38	3C	3D
2F	26	25	24	20	21	22	23	27	2B	2A	29	28	2C	2D
1F	16	15	14	10	11	12	13	17	1B	1A	19	18	1C	1D
5F	56	55	54	50	51	52	53	57	5B	5A	59	58	5C	5D
6F	66	65	64	60	61	62	63	67	6B	6A	69	68	6C	6D
7F	76	75	74	70	71	72	73	77	7B	7A	79	78	7C	7D

DOT DISPLAY:

KEY TEST SRV

7-SEGMENT DISPLAY: 1 0 4



③ Check item

A) Check the display in the test and the content of end print.

④ Test end

□□□□ 104	E -- □□□□ 104
Sum check data	Added sum check data
Normal end	Error

[5] Mode switch test

① Key operation

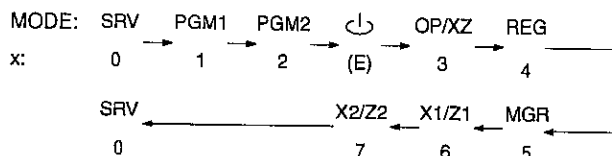
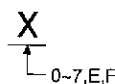
105 → **TL**

② Details of test

DOT DISPLAY:

MODE SW SRV

7-SEGMENT DISPLAY: 1 0 5



③ Check item

A) Check of the display in the test and the content of end print.

④ Test end

105	E - - - -	105
Normal end	Error	(Including halt of check by depressing any key.)

[6] Paper end sensor and near end sensor test

The paper end sensor and the near end sensor are optional units.

① Key operation

106 → TL

② Functional description

State of the paper end and near end sensor is sensed and displayed.

③ Check the following items:

On and off actions of the paper end and near end sensors are tested and their results are displayed.

ON/OFF check is performed for PES, NES and OPBS and the display is checked.

DOT DISPLAY: R J S E N S . S R V

7-SEGMENT DISPLAY: 1 0 6 W X Y Z

W: State of the NES

X: State of the RPES sensor

Y: State of the JPES sensor

Z: State of the OPBS sensor

Display	W/X/Y/Z	Description
JPES	0	Paper end sensor (JOURNAL) not detected
	1	Paper end sensor (JOURNAL) detected
RPES	0	Paper end sensor (RECEIPT) not detected
	1	Paper end sensor (RECEIPT) detected
NES	0	Journal side paper roll near end detected.
	1	Journal side paper roll near end not detected.
OPBS	0	Option ROM/RAM PWB detected
	1	Option ROM/RAM PWB not detected

NOTE: "1" is always displayed when no sensor is used.

④ Test termination

Any key depression causes the test to terminate with the termination message on printout.

Test termination print 106

[7] Calendar oscillator test

① Key operation

108 → TL

Functional description

This program is used to test the calendar oscillator function.

DOT DISPLAY: T I M E R S R V

7-SEGMENT DISPLAY: * * _ * *

② Check the following items:

i) Testing blinking "-". (500ms ON and OFF)

③ Test termination

Any key depression terminates the test with the termination print.

Test termination print 108

[8] SSP test

① Key operation

109 → TL

② Functional description

If an SSP is programmed, its contents are automatically checked and the result is printed.

DOT DISPLAY: S S P T E S T S R V

7-SEGMENT DISPLAY: 1 0 9 X

③ Check the following items:

Check printing of the termination message.

④ Test termination

The test terminates automatically after printing the termination print.

109 | E----- 109 | F----- 109 |
Normal end print Error print SSP table full print (NOTE)

Note: In this SSP check, set the data for check in the empty area of SSP entry REG and erase the data for check after completion of check. Therefore, SSP setting before check is not cleared. If, therefore, there is no SSP entry REG remained for SSP check, F-print (SSP entry register full print) is performed to terminate the program without check.

[9] Drawer open sensor test

① Key operation

110~111 → TL

② Functional description

The drawer indicated by the job number is opened to check the proper action.

Drawer opened: O indicated

Drawer closed: C indicated

110: Drawer-1: Standard drawer

111: Drawer-2: Remote drawer

DOT DISPLAY: D R A W E R X S R V

7-SEGMENT DISPLAY: 1 0 X Y

Y: O = Drawer opened

C = Drawer closed

X: 1 or 2

③ Check the following items:

a) Check opening of the specified drawer.

b) Check the display indication when the drawer is open and closed.

④ Any key depression terminates the test with the termination print.

Test termination print 11X X: 0~1

[10] Display test 2**① Key operation**116 → **[TL]****② Content**

The display CG's built in CKDC6 are checked. The 256 CG's are divided into 32 blocks, and each 8 characters are displayed on the dot display.

When initializing, the operation is started from CG code 00H ~ 07H. When any key is pressed, each block is displayed sequentially.

DOT DISPLAY: XY ○○○○○○

7-SEGMENT DISPLAY: 1 1 6

"XY" shows the top code of each block in hexa-decimal. (Example: A0, B8)

③ Check content

1. Check that the display is correct.
2. Check for no blur, break, and unevenness.

④ Cancel

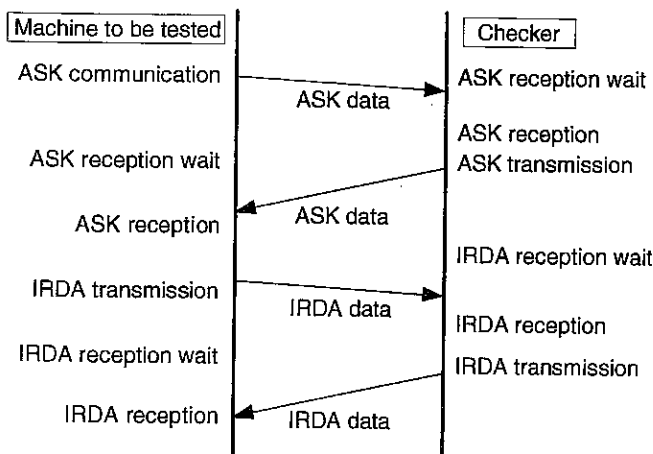
Set the mode key to other position than SRV mode, and the machine will stop after printing the end print.

116

End print

[11] I/R interface test

For I/R communication test, ER-A490 is used as the checker.

**① Key operation**

Perform key operation of 117 → **[TL]** to set the checker side to the reception wait state.

On the machine to be tested, perform the following key operation.

118 → **[TL]****② Details of test****1) Machine to be tested**

The following data are transmitted in the ASK format.

Transmission data (9600BPS) 00,11,22,33,44,55,66,77,88,
99,AA,BB,CC,DD,EE,FF

DOT DISPLAY: I / R SEND SRV

7-SEGMENT DISPLAY: 1 1 8 XXX

1') Checker

DOT DISPLAY: I / R RCEV SRV

7-SEGMENT DISPLAY: 1 1 7 XXX

After receiving the data, they are transmitted in the ASK format.

DOT DISPLAY: I / R SEND SRV

7-SEGMENT DISPLAY: 1 1 7 XXX

2) Machine to be tested

DOT DISPLAY: I / R RCEV SRV

7-SEGMENT DISPLAY: 1 1 8 XXX

If received data are the same as the transmitted data, it is normal.

Normal reception print	ASK	OK
Abnormal reception print	ASK	NG

After completion of printing, the following data are sent in the IRDA format.

Transmission data (9600BPS) 00,11,22,33,44,55,66,77,88,
99,AA,BB,CC,DD,EE,FF

DOT DISPLAY: I / R SEND SRV

7-SEGMENT DISPLAY: 1 1 8 XXX

2') Checker

DOT DISPLAY: I / R RCEV SRV

7-SEGMENT DISPLAY: 1 1 7 XXX

After receiving the data, they are sent in the IRDA format.

DOT DISPLAY: I / R SEND SRV

7-SEGMENT DISPLAY: 1 1 7 XXX

3) Machine to be tested

DOT DISPLAY: I / R RCEV SRV

7-SEGMENT DISPLAY: 1 1 8 XXX

If received data are the same as the transmitted data, it is normal.

Normal reception print	IRDA	OK
Abnormal reception print	IRDA	NG

③ Check item

Check the print contents (both ASK OK and IRDA OK).

④ Test end

The end print is made and the test is automatically terminated.

[12] Printer CG print**① Key operation**119 → **TL****② Content**

The built-in characters are printed.

After printing each line, the mode switch is checked. If the switch is set to another position than SRV mode, the program is stopped. If the mode switch is set to SRV mode, printing is continued.

The standard characters are printed in 16 characters/line, and the expanded characters (double-width characters) are printed in 8 characters/line.

First the standard characters are printed, then the expanded character.

DOT DISPLAY: CG PRINT SRV

7-SEGMENT DISPLAY: 1 1 9

③ Check content

The output print is checked to check that the CG's are normally printed.

④ Cancel

When any key is pressed, the operation is terminated after completion of one cycle. Or set the mode switch to another position than SRV mode.

[13] Standard RAM test**① Key operation**120 → **TL****② Functional description**

Perform the following check for the standard RAM 64 KByte SRAM. The memory contents should not be changed before and after the check.

Perform the following processes for memory address to be checked (1F0000H~1FFFFFH).

PASS1: Save memory data.

PASS2: Write data "0000H."

PASS3: Read and compare data "0000H," write data "5555H."

PASS4: Read and compare data "5555H," write data "AAAAH."

PASS5: Read and compare data "AAAAH."

PASS6: Restore the memory data.

If a compare error occurs in the check sequence PASS1-PASS6, an error print is made. If no error occurs through all address, the check ends normally.

The following address check is performed further.

Check point address = 1F0000H, 1F0001H

1F0002H, 1F0004H

1F0008H, 1F0010H

1F0020H, 1F0040H

1F0080H, 1F0100H

1F0200H, 1F0400H

1F0800H, 1F1000H

1F2000H, 1F4000H

1F8000H

DOT DISPLAY: S - R A M T S S R V

7-SEGMENT DISPLAY: 1 2 0

③ Check the following items:

Check the termination printout.

④ Test termination

The test terminates after printing the termination printout.

Termination printout:

Normal termination
Abnormal termination

	120
Ex -----	120

X = 01: Data check error
02: Address check error

Note: When an error occurs, the error print is performed and the check is terminated. The error occurrence address is shown in hexadecimal at positions shown with *****.

[14] Standard ROM test**① Key operation**130 → **TL****② Functional description**

Sum check of the standard ROM (C00000H - C7FFFFH) is performed. If the lower two digits of SUM is 10H, it is normal.

DOT DISPLAY: S - R A M T S S R V

7-SEGMENT DISPLAY: 1 3 0

③ Check the following items:

Check the printout after the test.

④ Test termination

The test automatically terminates with termination message.

Normal termination print

	130
ROM	<u>27040*****</u>

Error termination print

E -----	130
ROM	27040*****

Note: "*****" means the ROM version number.

The underlined section (10 bytes) of code table is provided in the ROM as a standard and the table content is always printed.

The table position is the upper 10 digits of the ROM address.

The check sum correction address is the last address -0FH.

[15] A/D conversion check**① Key operation**151 → **TL****② Contents**

The digital conversion value of the input signal to the CPU A/D convertor is displayed sequentially. The display channel is changes is approx. 1 sec. interval by timer control and is displayed repeatedly.

Thermistor input

DOT DISPLAY: T M = * * * * S R V

7-SEGMENT DISPLAY: 1 5 1 1 * * * *

Vrf input: Vrf means the presumed voltage of VRF when VCC is supposed to be +0.5V.

DOT DISPLAY: V R F = * * * * S R V

7-SEGMENT DISPLAY: 1 5 1 2 * * * *

+24V input

DOT DISPLAY: V P = * * * * S R V

7-SEGMENT DISPLAY: 1 5 1 3 * * * *

Note: "****": The 10 bit data of the A/D convertor displayed in decimal number.
Therefore, its connect may be 0000 ~ 1024.

③ Confirmation

Check the display content.

④ Termination

To when the mode switch is set to any mode other than SRV mode, the termination print is made and the test is terminated.

151
Test termination print

[16] Option RAM test

① Key operation

200 or 201 → TL

JOB #NO.	RAM NO.	Memory to be checked	Address area to be checked
200	Option RAM	ER-02RA	200000H ~ 21FFFFH
201		ER-03RA	200000H ~ 27FFFFH

② Content

The following check are performed for the optional RAM.

The following process is performed for memory addresses to be checked.

PASS1: memory data save

PASS2: Data "0000H" write

PASS3: Data "0000H" read and comparison, data "5555H" write

PASS4: Data "5555H" read and comparison, data "AAAAH" write

PASS5: Data "AAAAH" read and comparison

PASS6: Memory data restore

If a compare error is found in the check sequence from PASS1 to PASS6, error print (error code E1) is performed. If there is no error found to the end of the last address, the operation is completed normally.

Then the following address check is performed. "O" shows a valid address, and "X" shows an invalid address.

In case of an error, error code E2 is printed.

Check Address	JOB#200 (ER-02RA)	JOB#201 (ER-03RA)
200000H	O	O
200001H	O	O
200002H	O	O
200004H	O	O
200008H	O	O
200010H	O	O
200020H	O	O
200040H	O	O
200080H	O	O
200100H	O	O
200200H	O	O
200400H	O	O
200800H	O	O
201000H	O	O
202000H	O	O
204000H	O	O
208000H	O	O
210000H	O	O
220000H	X	O
240000H	X	O
260000H	X	O

7-SEGMENT DISPLAY: 2

- ③ Check the following items.
Check the termination print.

④ Test termination

The test terminates after printing the termination printout.

Termination print

E01---	200	(ER-02RA data check error)
E02---	200	(ER-02RA address check error)

E01---	200	(ER-03RA data check error)
E02---	201	(ER-03RA address check error)

	200	(ER-02RA normal end)
	201	(ER-03RA normal end)

*****: Error address

[17] Option ROM test

① Key operation:

400 → TL

② Functional description:

A sum check is done for the option ROM (Address hex C80000H thru C9FFFFH.)

DOT DISPLAY: O - R O M T S S R V

7-SEGMENT DISPLAY: 4 0 0

- ③ Check the following items:
Check the termination printout.

④ Test termination:

The test terminates after printing the termination printout.
Termination printout

Normal termination		400
ROM	27010*****	

E-----		400
ROM	27010*****	

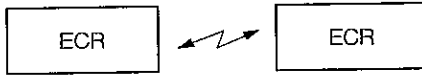
The underlined section must be the same as the standard ROM test specification. (Refer to JOB #130.)

CHAPTER 6. DOWNLOAD FUNCTION

1. General

RAM data can be transmitted in the following two methods.
Save the data before servicing as follows:

① ECR ↔ ECR



② ECR ↔ ER-02FD



Note: The ONL lamp on the display blinks during IR transmission. If the ONL lamp goes off during transmission, it shows that transmission is interrupted by a shift in the optical axis and retrying process is being performed. To resume transmission, adjust the optical axis. If the ON lamp blinks, transmission is resumed.

2. Communication between ECRs

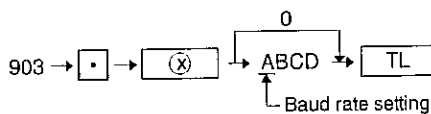
- The pop-up display of the ER-A490 is equipped with the IR interface. Set the distance between IR interfaces within 75cm. Communication between ECRs is available in the ASK system and in the IRDA system.

Note: Set the memory size (JOB #971) and the transmission baud rate (JOB #903) in the receive side and the send side identically.

• ECR to ECR

O: Enable X: Disable

Baud rate (bps)	ASK	IrDA
2400	O	O
4800	O	O
9600	O	O
19200	O	O
38400	O	O
57600	O	O
115200	X	O

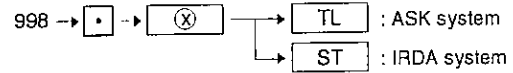


1. Baud rate (bps)	903-A
2400	2
4800	3
9600	4
19200	5
38400	6
57600	7
115200	8

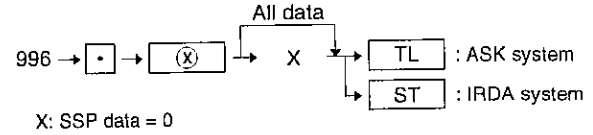
★

2) Communication sequence

- Set the receiving ECR ready to receive.



- Set the sending ECR.



3) Transmission status.

Description of error status

- Application error (Command error)
- Application error (Parity error)
- Application error (Check sum error)
- Application error (Data size error)
- Hard ware error
- Power off error
- Application error (Transmit data size error)
- Application error (Block sequence error)
- Application error (NAK error)
- Application error (Machine type error)

- Service reset the receiving ECR.

3. Communication between an ECR and the ER-01FD/02FD

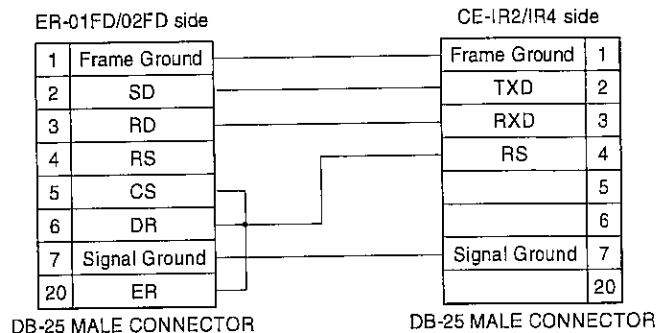
- The ER-A490 can perform IR communication by connecting the IR interface (CE-IR2/IR4) to the FD unit (ER-01FD/02FD). The transmission is made only in the ASK system.
- ER-01FD/02FD ROM replacement
To perform IR communication with the ER-01FD or the ER-02FD, the control ROM must be replaced.

New control ROM version for IR communication

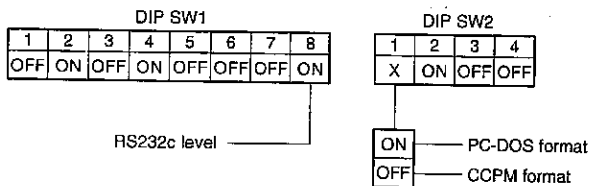
	Version No.	Parts code
ER-01FD	R261C	VHI27256R261C
ER-02FD	RAG1D	VHI27256RAG1D

- Connection between the ER-01FD/02FD and the CE-IR2/IR4
Make the connection cable and connect the FD unit and the IR interface.

Connection cable wiring



4) DIP switch setting of the ER-01FD/02FD



Note: When performing IR communication with the ER-A490, the baud rate should be set to 4800/9600/19200.

The PC-DOS format cannot be used for the ER-01FD.

5) CE-IR2/IR4 setting

① CE-IR2

The CE-IR2 is used in the ASK mode only, and requires no setting.

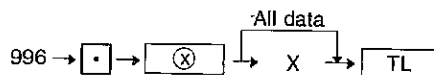
② CE-IR4

When the power switch of CE-IR4 is turned on, the mode is set to the ASK mode. The ASK mode is retained until the power switch is turned off.

6) Saving data

① Turn on the power switch and insert a floppy disk which has been formatted.

② Start the SEND JOB on the ECR side as follows:



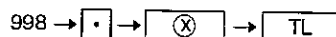
X: 0 = SSP

③ Data transmission is started and the green lamp on the ER-02FD blinks.

7) Loading data

① Turn on the power switch and insert the floppy disk which stores the data.

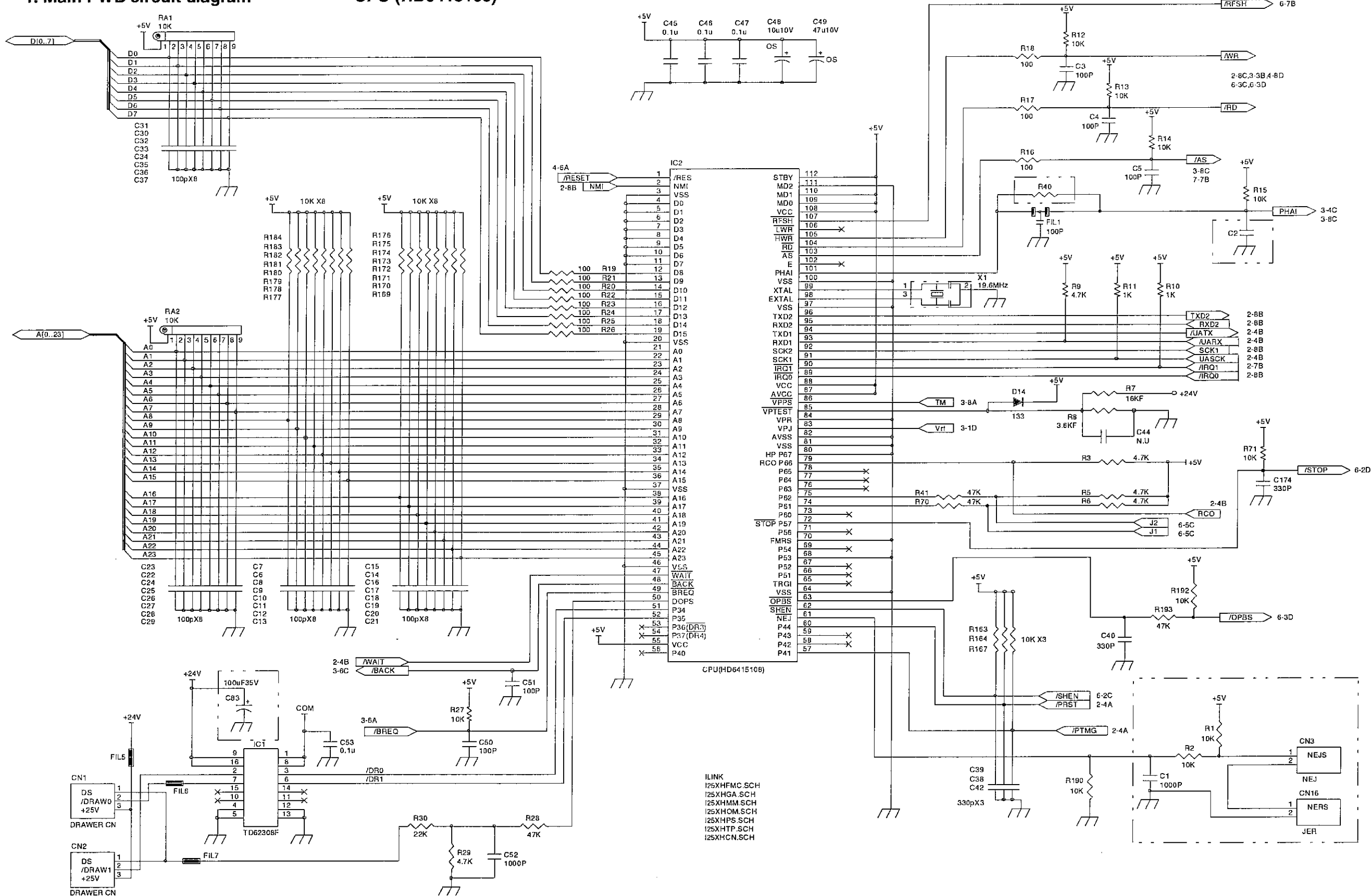
② Start the RECEIVE JOB on the ECR side as follows:



③ Press the **SEND** key on the FD unit.

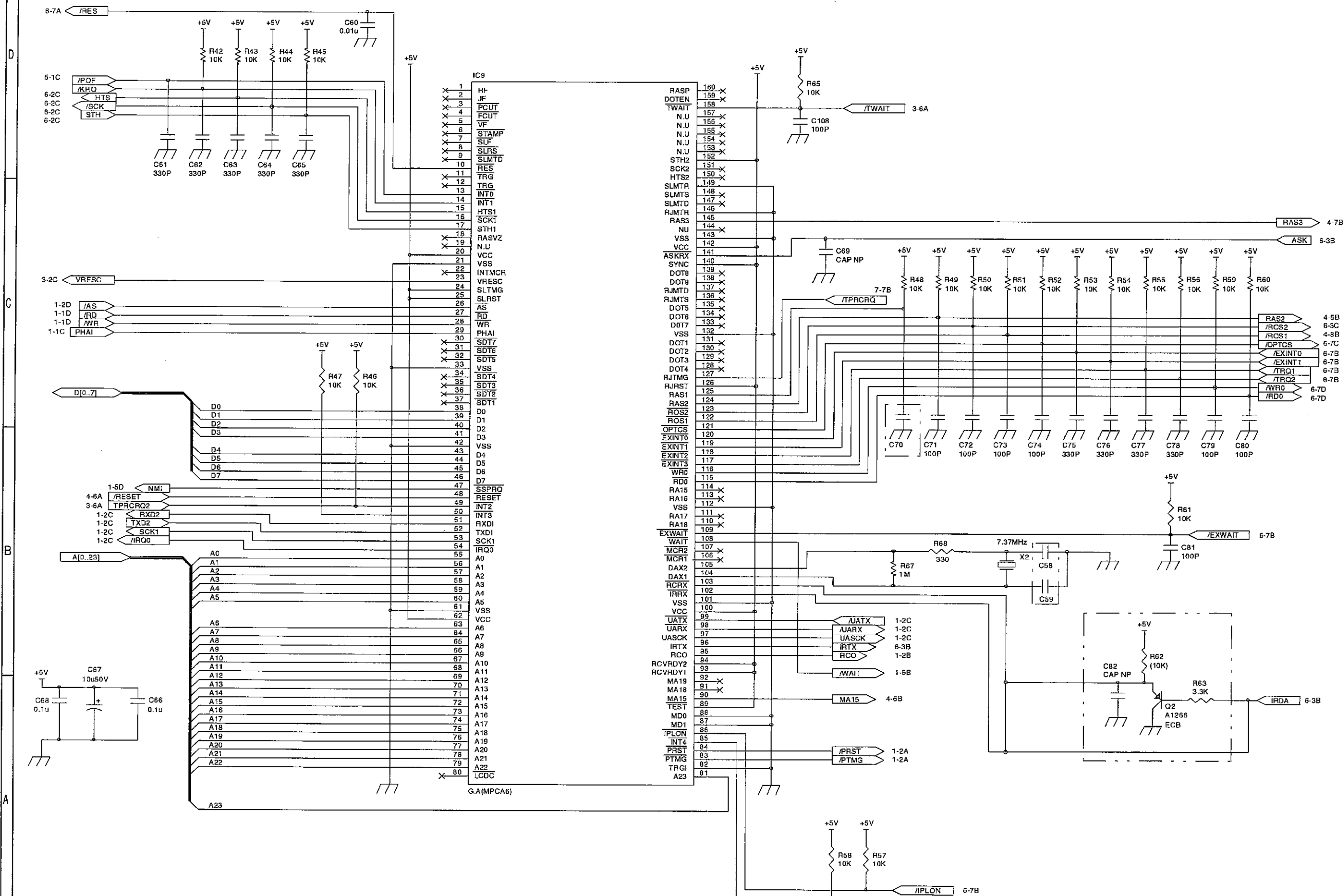
④ Data transmission is started and the Green lamp on the ER-02FD blinks.

⑤ Service reset the ECR.



Gate array (MPCA6)

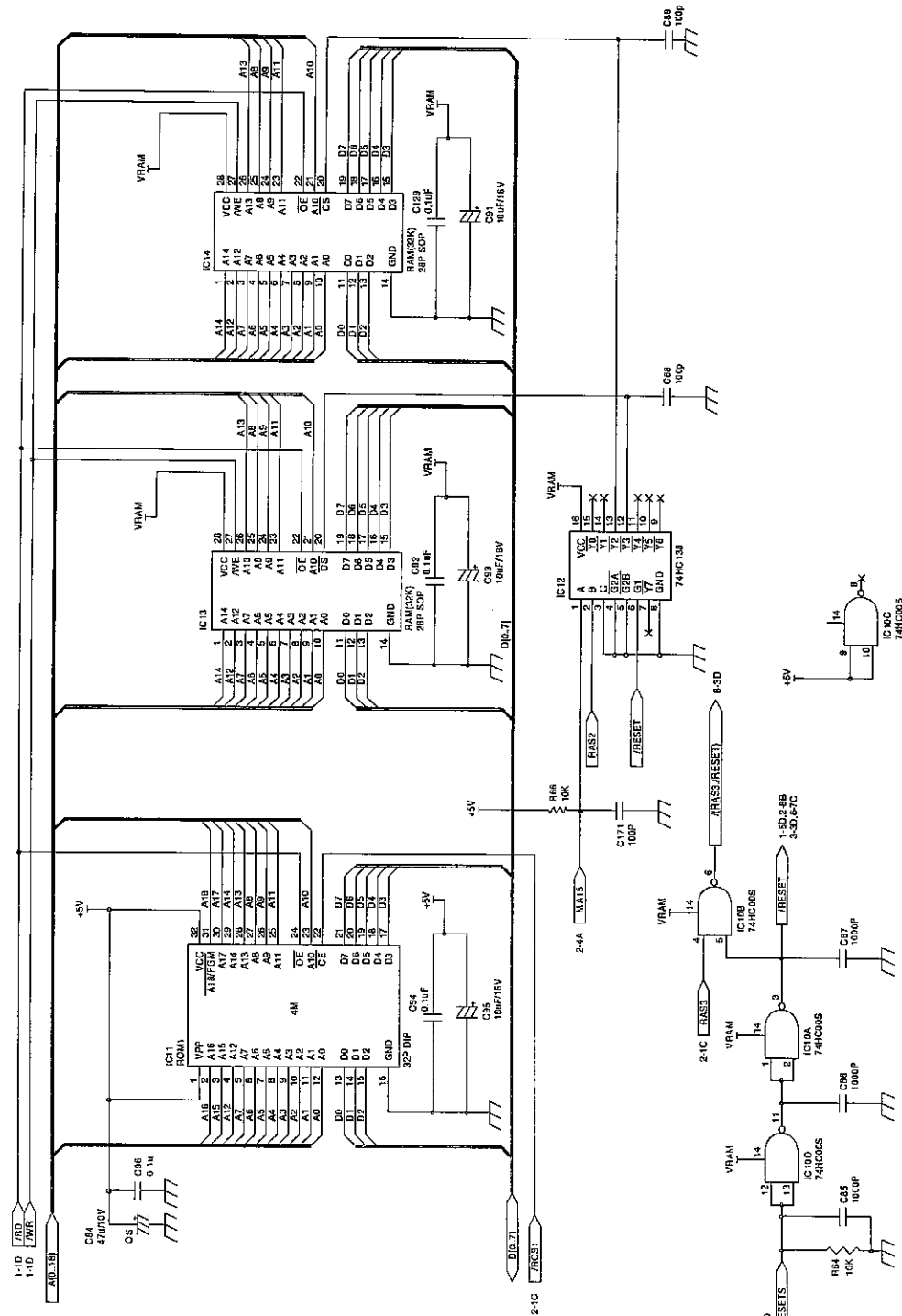
2/6





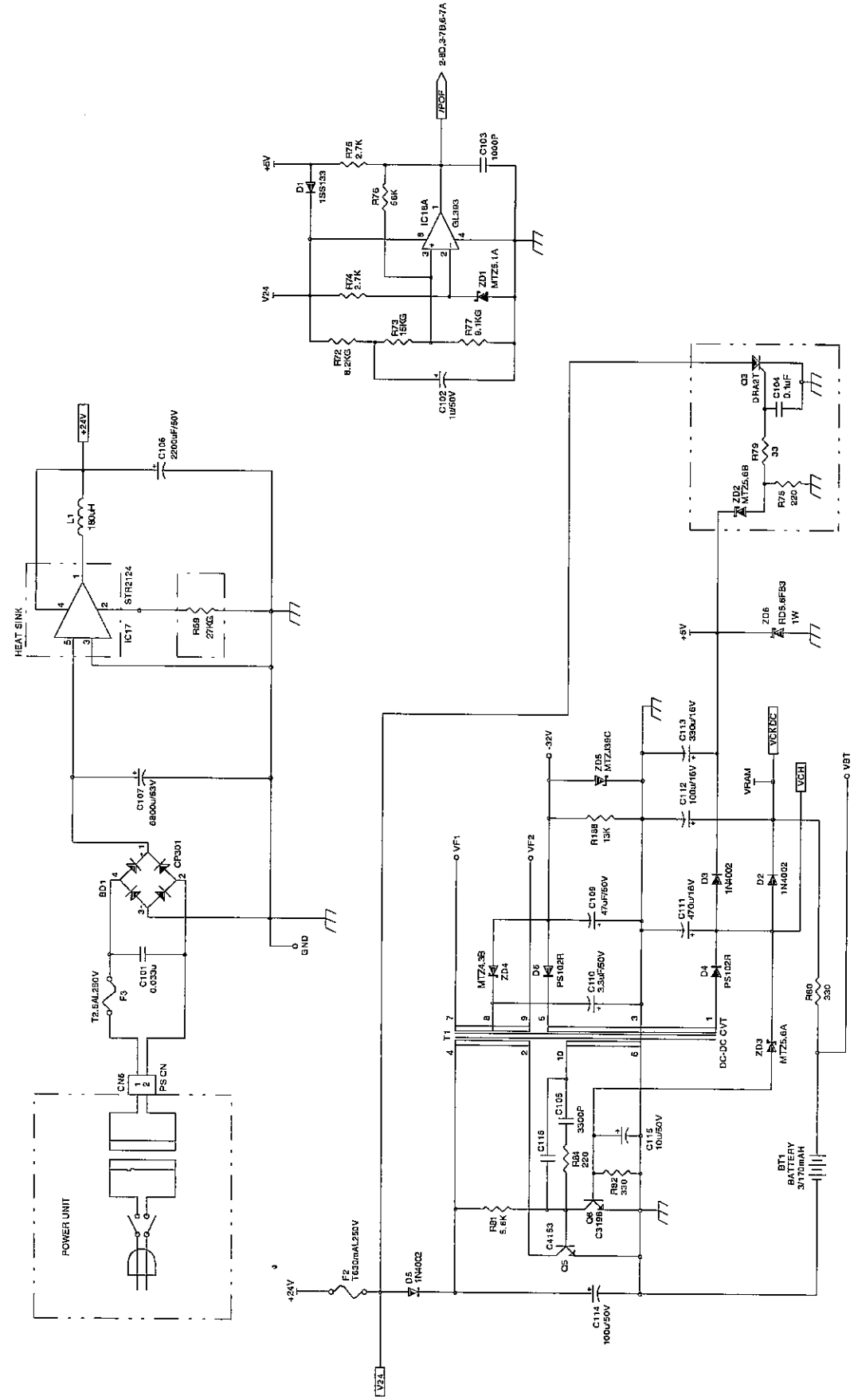
Memory

4/6



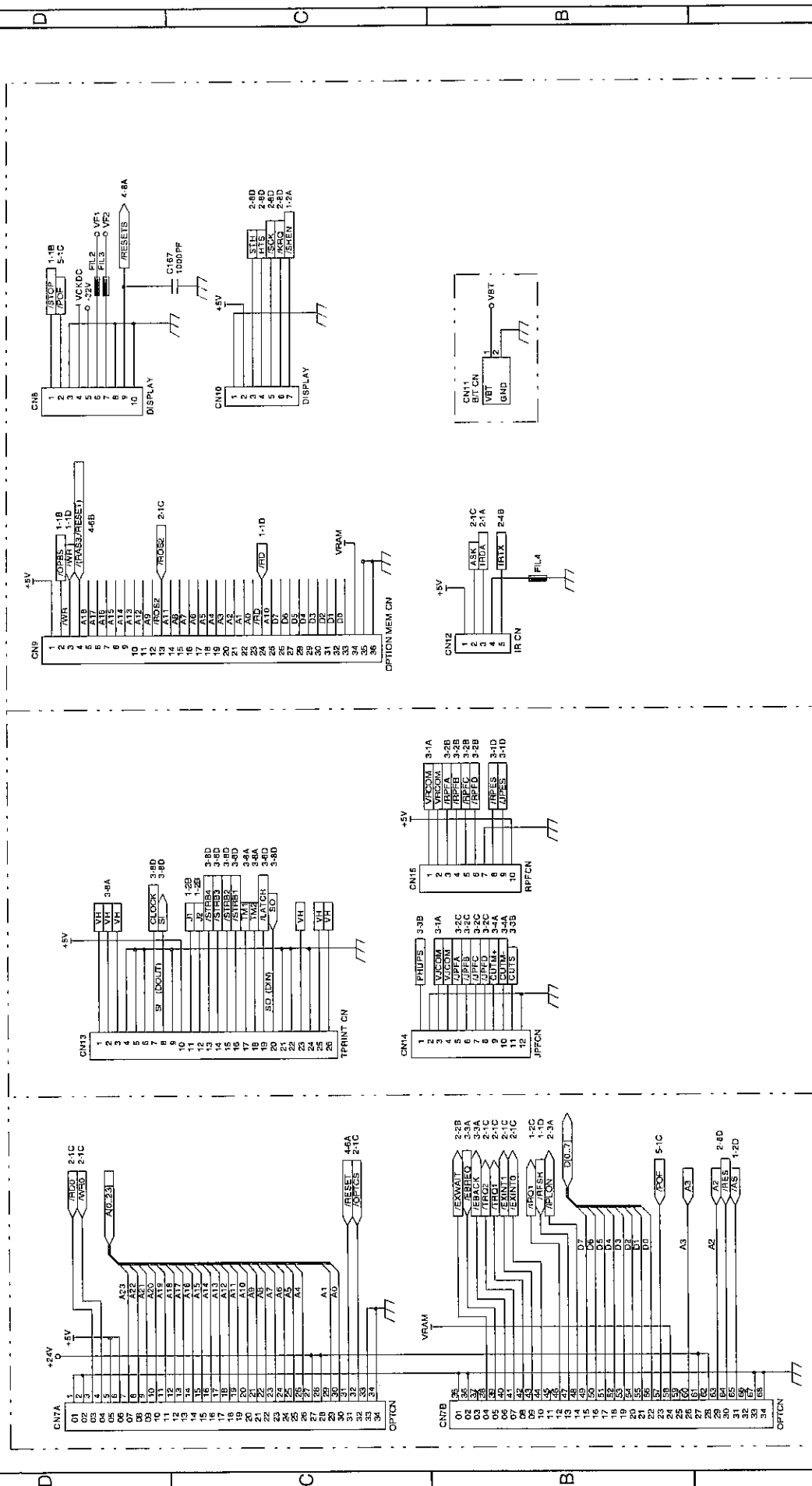
Power supply

5/6



Main PWB connector

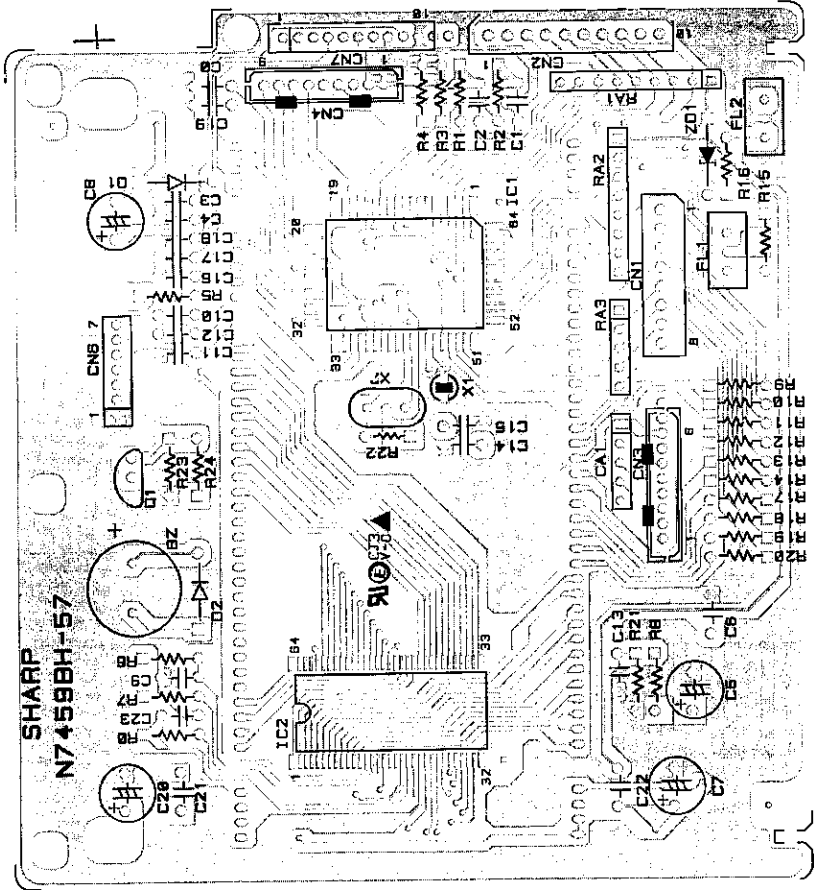
6/6



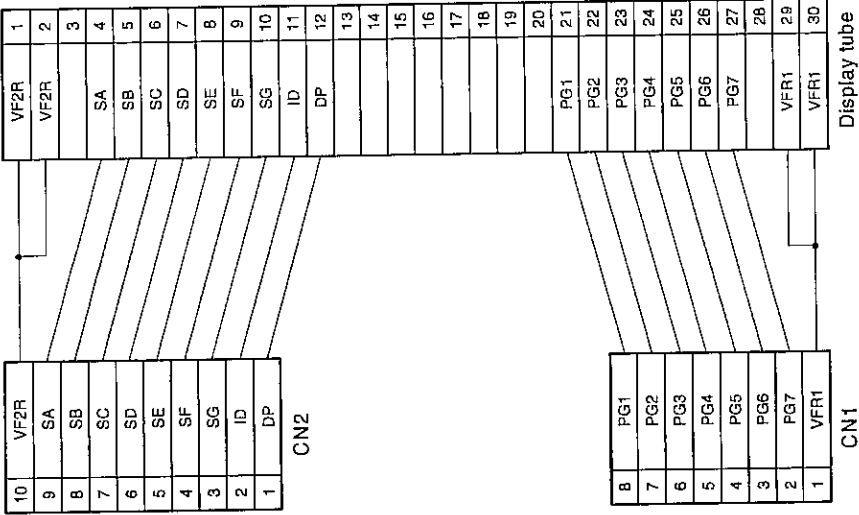




4. Display PWB layout

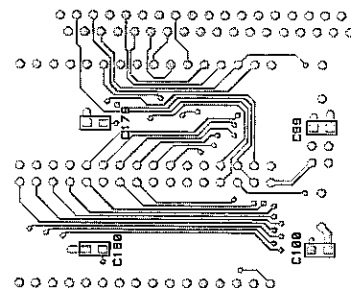
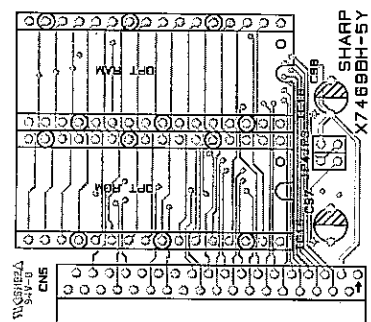
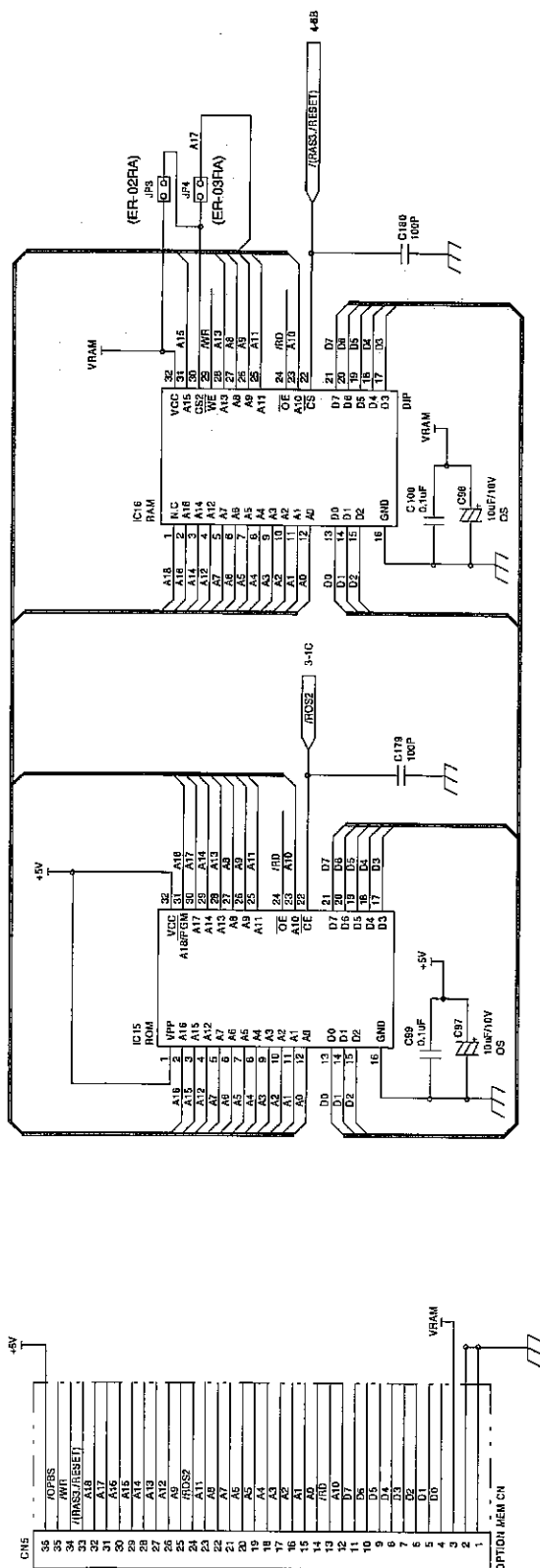


5. POP-up display PWB circuit diagram

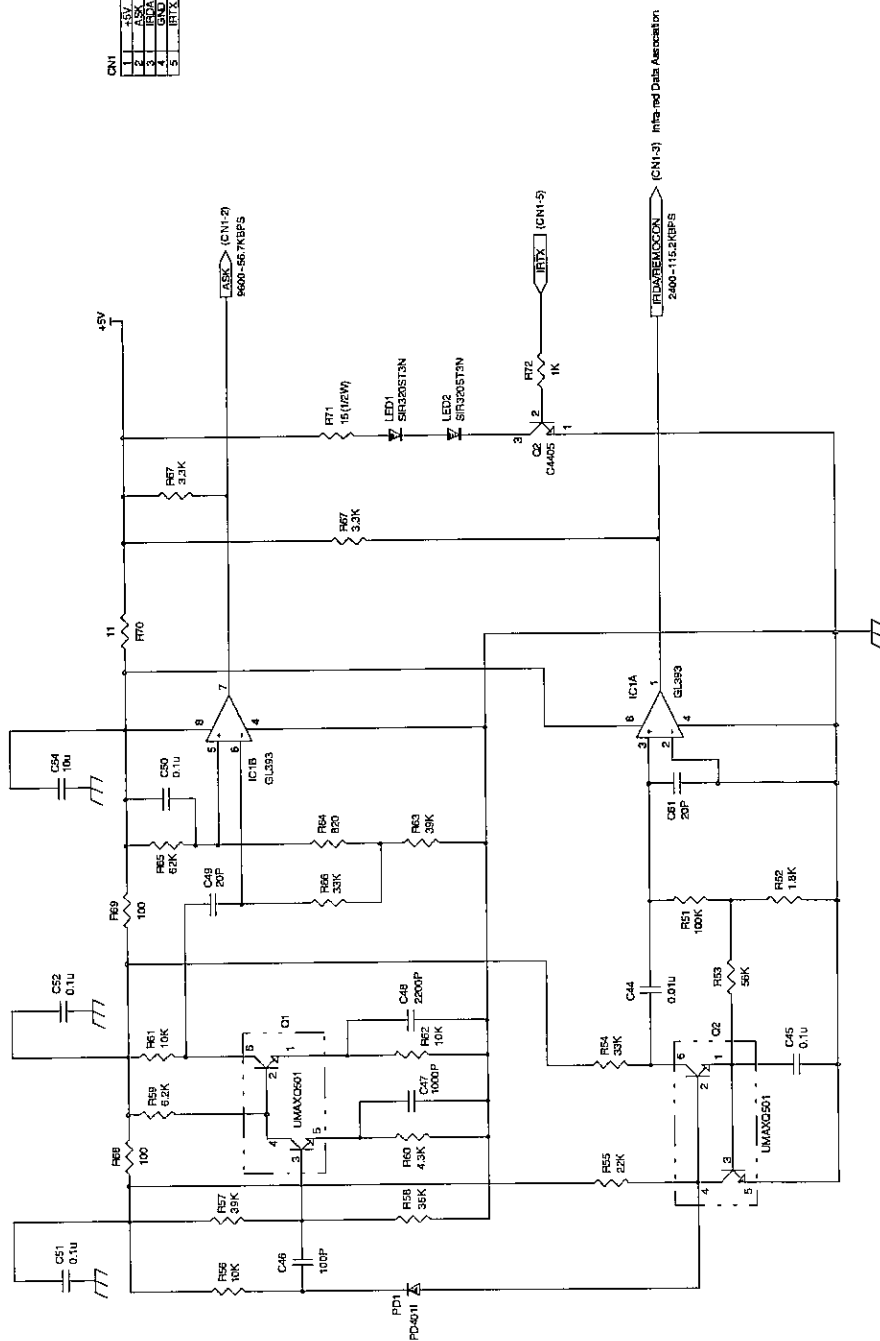


6. POP-up display PWB layout

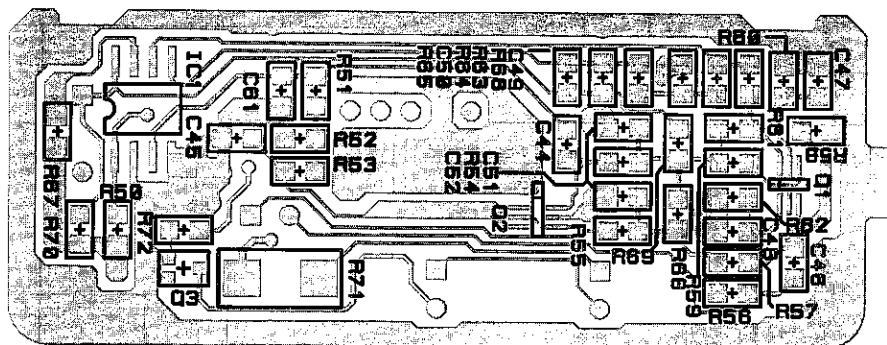
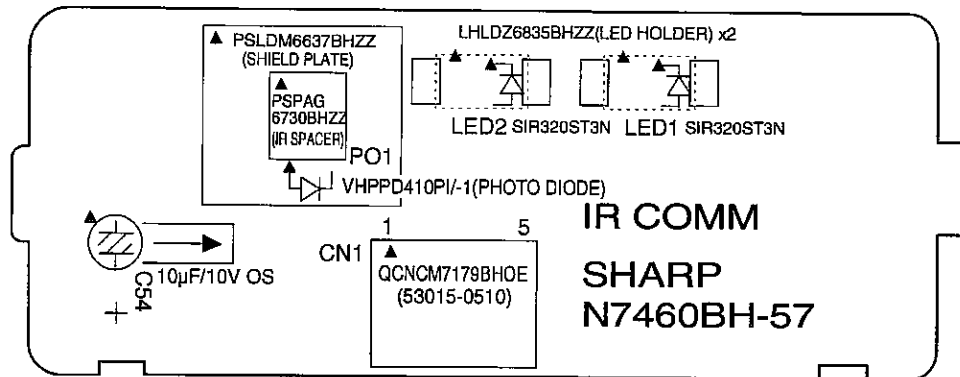


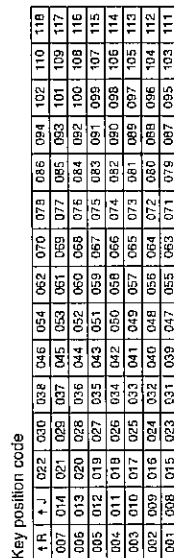


- 55 -



10. IR PWB layout

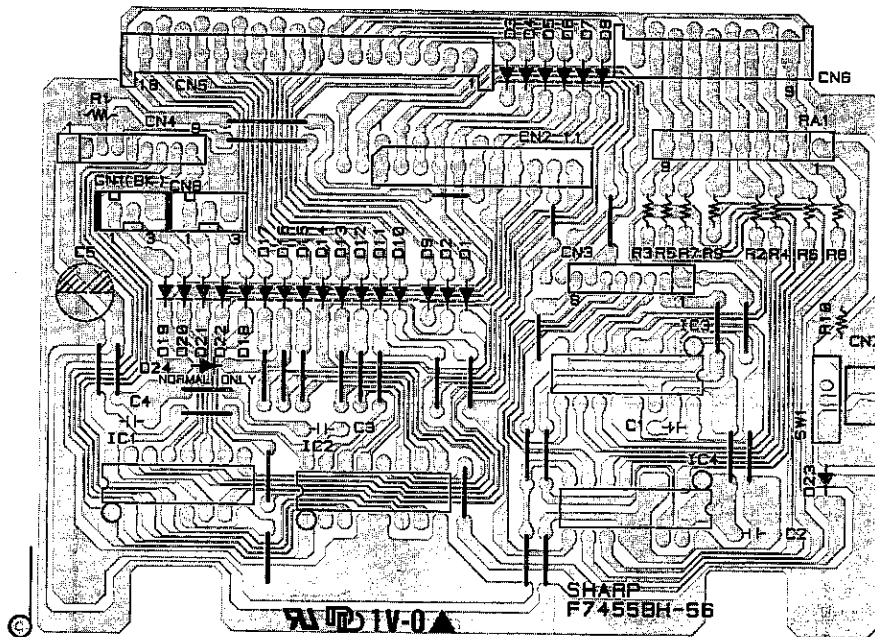




CN1	1	AC0
	2	AC1
	3	AC2

CN2	1	AC2
	2	AC3

12. Keyboard PWB layout



SHARP PARTS GUIDE

MODEL ER-A490

(for KA, KB, TQ, TR, TS)

PRINTER: PR-58M: KA, KB
PR-58A: TQ, TR, TS

CONTENTS

- | | |
|---|--|
| 1 Top cabinet etc. | 7 Display PWB unit |
| 2 Bottom cabinet etc. | 8 IR PWB unit |
| 3 Drawer box unit(SK423 type)
[for KA, KB] | 9 Pop-up PWB unit |
| 4 Packing material & Accessories | 10 ROM/RAM PWB unit |
| 5 Main PWB unit | 11 Articles for consumption |
| 6 Key I/F PWB unit | 12 Service route options & Service tools |
| | ■ Index |

Because parts marked with "△" is indispensable for the machine safety maintenance and operation, it must be replaced with the parts specific to the product specification.

Table of destinations

SELECTION CODE	COUNTRIES
U	U.S.A., Guam
A	Canada
TS	Germany
TQ	SEEG territory other than Germany (Stamp: English)
TR	SEEG territory other than Germany (Stamp: Spanish)
KB	U. Kingdom
KA	Australia

SELECTION CODE	COUNTRIES
K	Korea

SELECTION CODE	COUNTRIES
SB	Saudi Arabia (127V area)
SBA	Saudi Arabia (220V area)
SC	Taiwan
SD	Venezuela
SE	Hong Kong
SG	Lebanon, Syria, Greece, Pakistan, Iran, Egypt, Thailand, Iraq, Mauritius, Seychelles, Tahiti, Jordan, Sudan, Turkey
SH	South Africa (U.S.A.version)
SHE	South Africa (Europe version)
SJ	Philippines (Europe version)
SJ2	Philippines (U.S.A. version)
SM	Kuwait, Qatar, Oman, UAE, Malta, Bahrain
SMT	Nigeria, Yemen, Kenya

SELECTION CODE	COUNTRIES
RA1	Morocco, Algeria, Tunisia, West Africa
RA2	Chile, Uruguay, Peru, Argentina, Paraguay
RA5	Sri Lanka

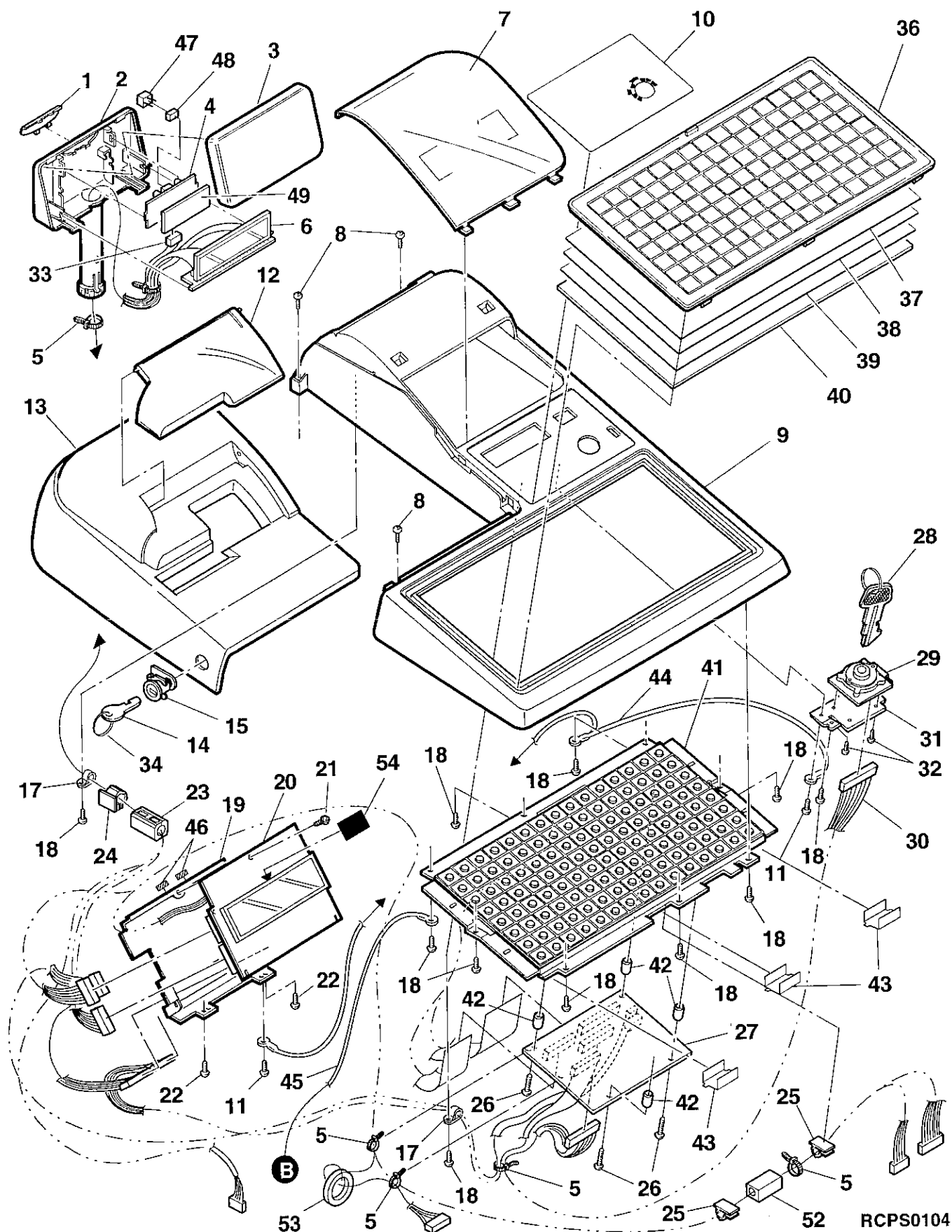
SELECTION CODE	COUNTRIES
RB3	Indonesia
RB4	
RB5	Cyprus
RB6	Panama
RB7	Barbados
RB8	Malaysia (U.S.A. version)

SELECTION CODE	COUNTRIES
RC1	Malaysia (Europe version)
RC2	Singapore
RC5	Dominican Republic, Ecuador

1 Top cabinet etc.

[illegible]

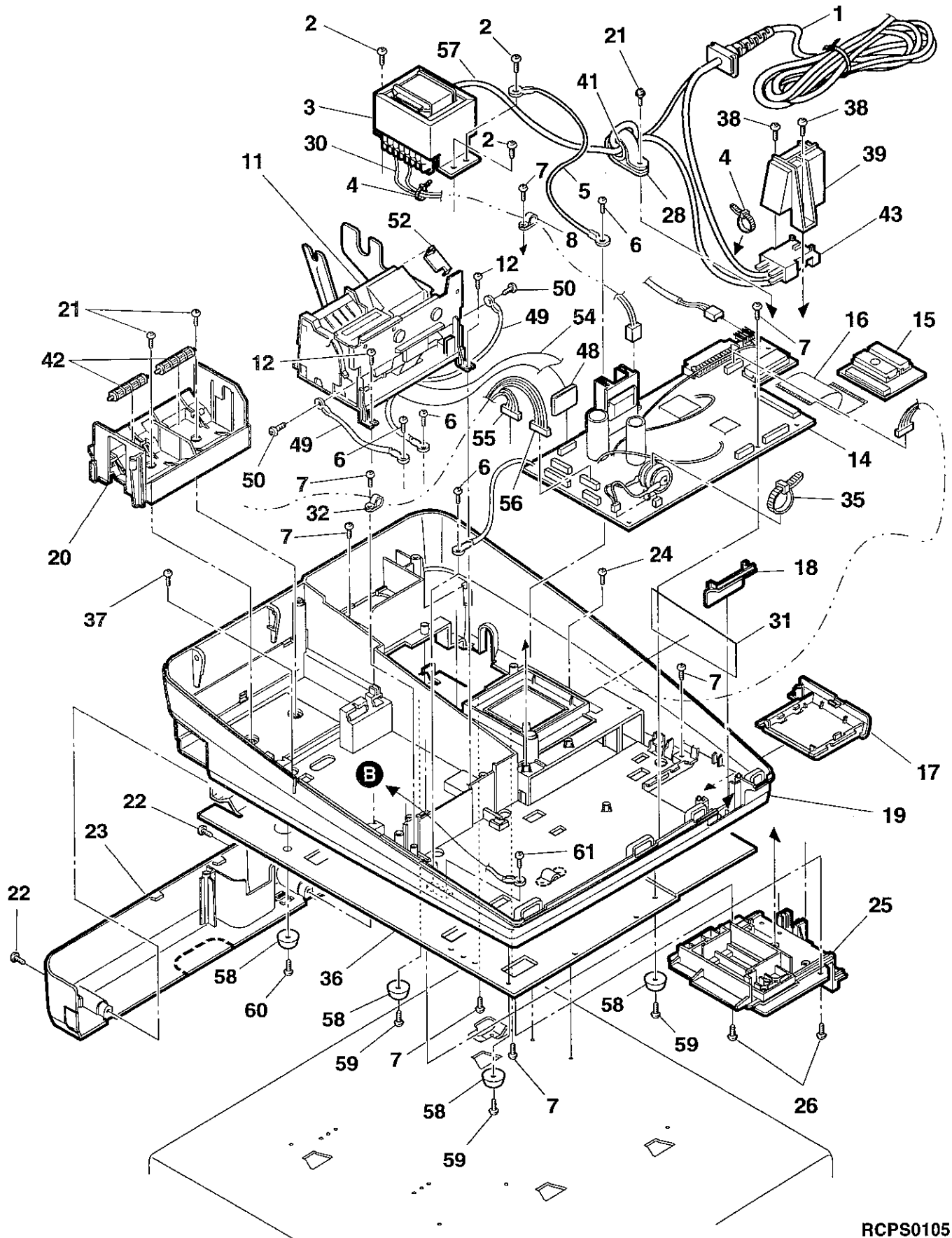
1 Top cabinet etc.



2 Bottom cabinet etc.

NO.	PARTS CODE	PRICE RANK	NEW MARK	PART RANK	DESCRIPTION
1	QACCL1018CCN1	AV		B	AC cord (7.5A) [KA]
	QCNW-1035CCZZ	AL		B	AC cord [KB]
	QPLGA0006QCZZ	AQ		C	Plug (3A 250V) [KB]
	QACCE3120QCN5	AL		B	AC cord (250V 2.5A) [TQ,TR,TS]
2	XUBSD40P08000	AA		C	Screw (4 × 8)
3	RTRNP6883BHZZ	BF		B	Powwer tnsformer (220V) [TS,TQ]
	RTRNP6885BHZZ	BG	N	B	Powwer tnsformer (230-240V) [KA,KB]
4	LBNDJ2003SCZZ	AA		C	Cable band
5	QCNW-7768BHZZ	AE		C	Earth wire
6	XHPSD30P06K00	AA		C	Screw (M3 × 6K)
7	XEBSD30P08000	AA		C	Screw (M3 × 8)
8	LHLDW0006SCZZ	AB		C	Cable holder (3N)
11	KI-OB6777BHZZ	CF		E	Printer unit (PR-58M) [KA,KB]
	KI-OB6777BHZA	CL	N	E	Printer unit (PR-58A) [TQ,TR,TS]
12	XJPSP30P12X00	AB		C	Screw (3 × 12X) (for Printer)
14	CPWBX7466BH03	CM	N	E	Main PWB unit [KB,TQ,TR,TS]
	CPWBX7466BH05	CM	N	E	Main PWB unit [KA]
15	CPWBN7458BH01	BK		E	ROM/RAM PWB unit
16	QCNW-7749BHZZ	AP		C	OP flat cable (36p) (Main PWB-OP Memory PWB)
17	GCÖVA7105BHZZ	AU		D	ROM/RAM case
18	GCÖVA7107BHZA	AL		D	Cleak cover A
19	GCABA7219BHZZ	BL	N	D	Bottom cabinet
20	LPLTP6699BHZZ	AS		C	Paper plate
21	LX-BZ1085CCZZ	AA		C	Screw (3 × 8)
22	XBBSC30P20000	AA		C	Screw (3 × 20)
23	GCÖVA7104BHZZ	AV		D	Rear cover
24	LX-BZ6782BHZZ	AA		C	Screw
25	GCÖVH7106BHZZ	AU		D	Trans cover
26	XUPSD40P12000	AA		C	Screw (M4 × 12)
28	LBNDJ6636BHZZ	AD		C	B/T band
30	QCNW-7752BHZZ	AH		C	PS cable
31	TCAUS6677BHZZ	AD		D	Caution label
32	LHLDW0008SCZZ	AA		C	Cable holder (5N)
35	LBNDJ2004BHZZ	AB		C	Nylon band (140mm)
36	LCHSM6704BHZZ	AY		C	Main chassis
37	XHPSD40P08KS0	AA		C	(4 × 8KS) [KA,KB]
38	XJBSD30P10000	AA		C	Screw (3 × 10)
39	LHLDQ6839BHZZ	AL		C	S/W holder
41	RCÖRF6696BHZZ	AL		C	Core (TC28A)
42	NRÖLP6656BHZZ	AF		C	Roller
43	QSW-C9212QCZZ	AH		B	Power switch
48	RCÖRF6701BHZZ	AV		C	Core
49	QCNW-7122RCZZ	AD		C	Earth wire
50	XBPSD30P06K00	AA		C	Screw (3 × 6K)
52	MLEVP6715BHZZ	AF		C	Stopper
54	QCNW-7783BHZZ	AQ		C	TP flat cable (26pin)
55	QCNW-7781BHZZ	AQ		C	JPF cable (12pin)
56	QCNW-7782BHZZ	AP		C	RPF cable (10pin)
57	QCNW-7767BHZZ	AE		C	Lead wire(for sw)
58	PGUMM6696BHZZ	AE		C	Gum leg [TQ,TS,TR]
59	LX-HZ0056BHZZ	AA		C	Screw [TQ,TS,TR]
60	XJBSD30P14000	AA		C	Screw (3 × 14) [TQ,TS,TR]
61	XHBSD30P04000	AA		C	Screw (3 × 4)

2 Bottom cabinet etc.

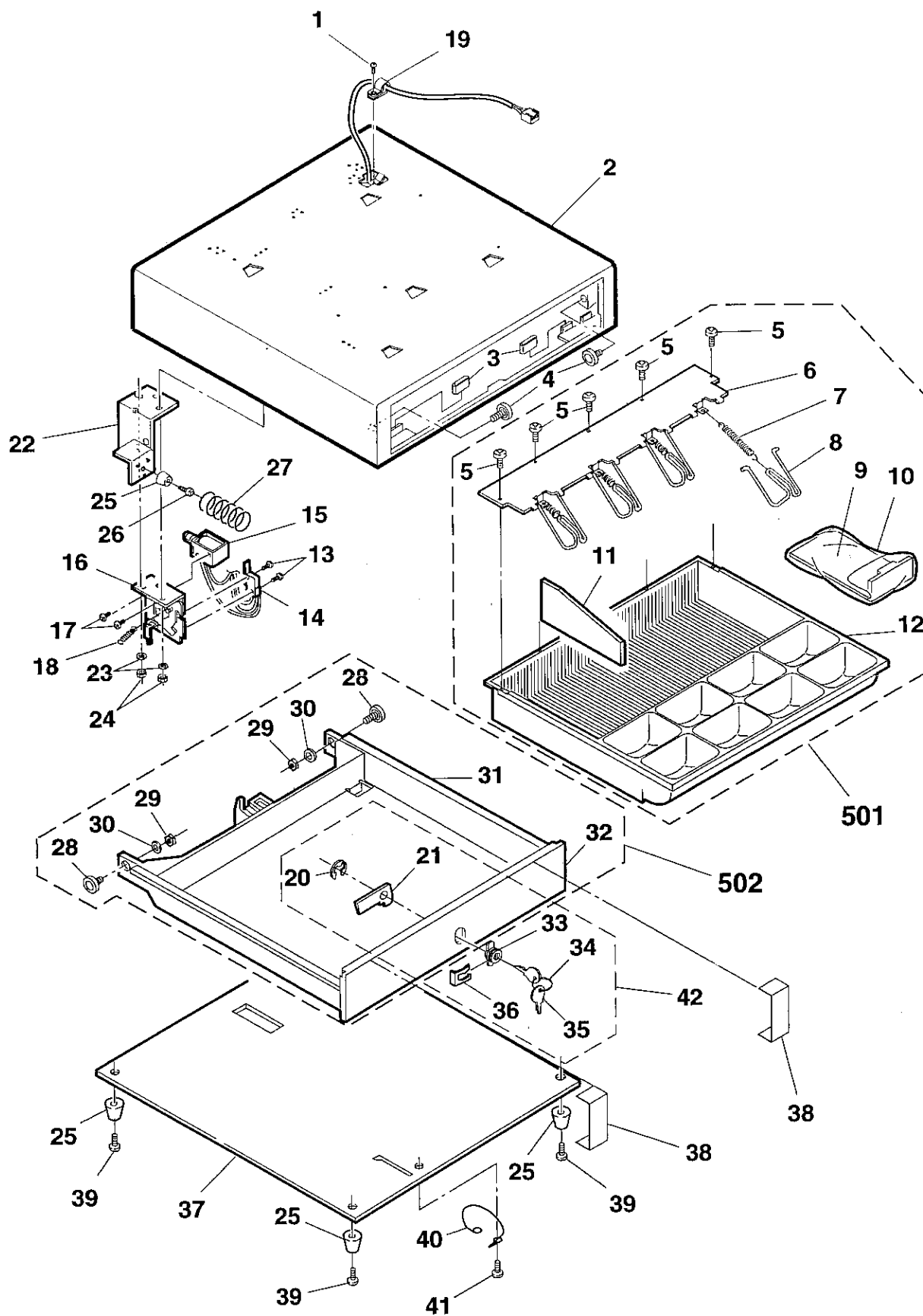


RCPS0105

3 Drawer box unit(SK423 type)[for KA,KB]

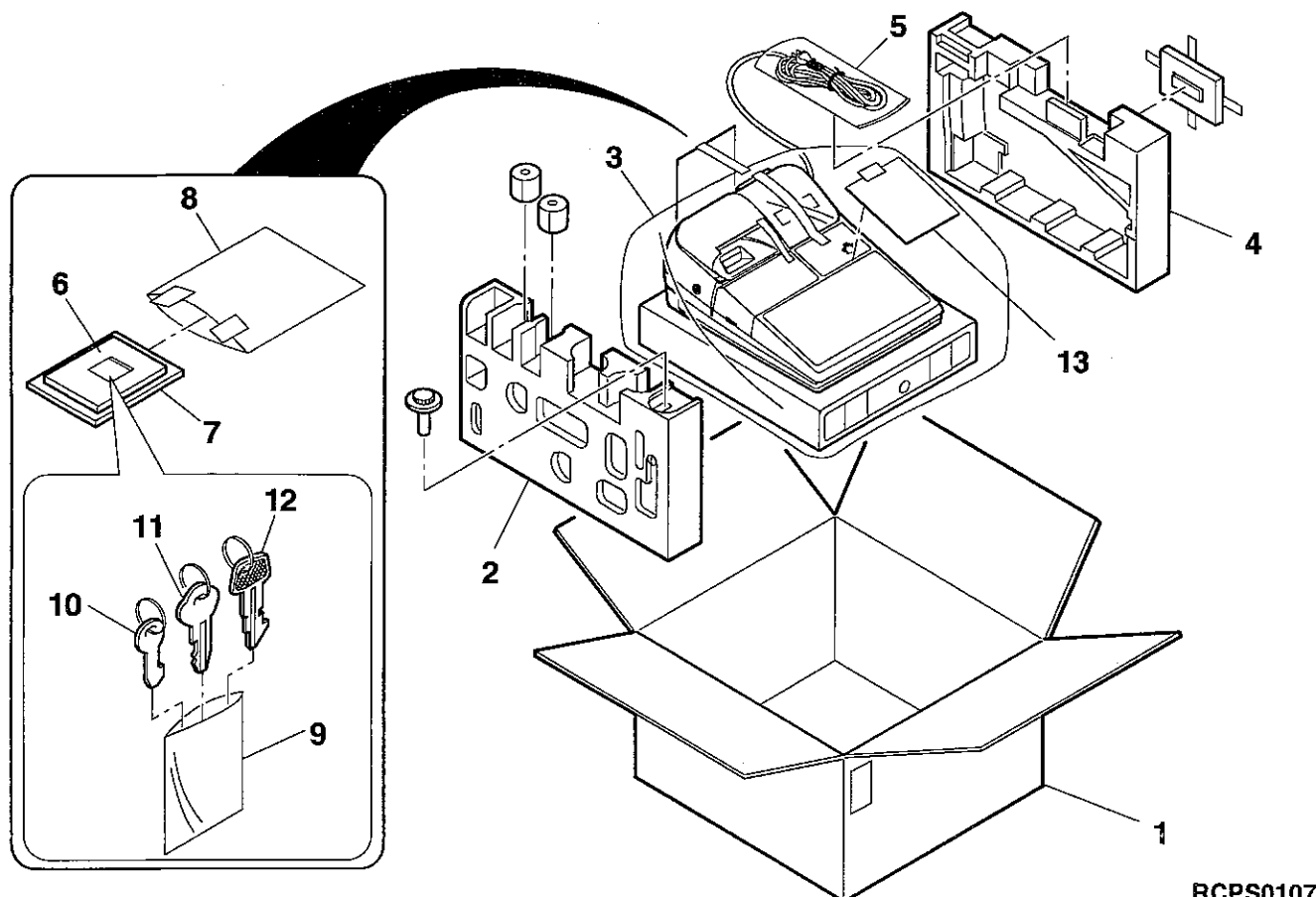
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③ Drawer box unit(SK423 type)[for KA,KB]



4 Packing material & Accessories

NO.	PARTS CODE	PRICE RANK	NEW MARK	PART RANK	DESCRIPTION
1	SPAKC8354BHZZ	BA	N	D	Packing case [KA,KB]
	SPAKC8354BHZA	BB	N	D	Packing case [TQ,TS,TR]
2	SPAKA8337BHZL	AU		D	Packing add L [KA,KB]
	SPAKA8361BHZL	AW	N	D	Packing add L [TQ,TS,TR]
3	PSHEP6681BHZZ	AF		D	Packing sheet (1000 X 1000)
4	SPAKA8337BHZR	AU		D	Packing add R [KA,KB]
	SPAKA8361BHZR	AW	N	D	Packing add R [TQ,TS,TR]
5	SSAKH4231CCZZ	AA		D	Vinyl sack (140 X 500)
6	TiNSE7350BHZZ	BD	N	D	Instruction book (E) (1)
	TiNSF7351BHZZ	BD	N	D	Instruction book (F) (1)
	TiNSG7352BHZZ	BD	N	D	Instruction book (G) (1) [TQ,TR,TS]
	TiNSS7353BHZZ	BD	N	D	Instruction book (S) (1) [TQ,TR,TS]
7	TiNSE7350BHZA	AY	N	D	Instruction book (E) (2)
	TiNSF7351BHZA	AY	N	D	Instruction book (F) (2)
	TiNSG7352BHZA	AY	N	D	Instruction book (G) (2) [TQ,TR,TS]
	TiNSS7353BHZA	AY	N	D	Instruction book (S) (2) [TQ,TR,TS]
8	SSAKH3015CCZZ	AA		D	Vinyl bag (200 X 300mm)
	SSAKH0013HCZZ	AA		D	Vinyl bag [KA,KB]
9	SSAKH3012CCZZ	AA		D	Vinyl sack (80 X 120) [TQ,TR,TS]
10	LKGIM7356BHZZ	AK		B	Printer cover lock key
11	LKGIM7331BHZZ	AE		B	Lock key (1pc)
12	LKGIM7111BHZZ	AE		B	OP key
	LKGIM7129BHZZ	AE		B	MA key
	LKGIM7110BHZZ	AE		B	SM key
13	TCADH6788BHZA	AC		D	Caution card (Black)



RCPS0107

5 Main PWB unit

NO.	PARTS CODE	PRICE RANK	NEW MARK	PART RANK	DESCRIPTION
1	VHIF258024PC/	AZ		B	IC (F258024PC) [IC22]
2	VHIG76C256F70	BC		B	IC (G76C256F70) [IC13,14]
3	VHIMC74HC138F	AG		B	IC (74HC138F) [IC12]
4	VHIH641510810	BA		B	IC (H641510810) [IC2]
5	VHIIIR9393N/-1	AD		B	IC (IR9393N) [IC18,23,24]
6	VHILC3564SM70	AS		B	IC (LC3564SM70) [IC29]
7	VHILZ9AH30/-1	BA		B	IC (LZ9AH30) [IC9]
8	VHISN74HC00NS	AC		B	IC (SN74HC00NS) [IC10]
9	VHITD62308F-1	AH		B	IC (TD62308F) [IC1]
10	VS2SJ328-Z/-1	AP		B	Transistor (2SJ328-Z) [Q9]
11	VRS-TS2AD103J	AA		C	Resistor (1/10W 10KΩ ±5%) [R12-15,27,42-61,64-66,71,85-91]
	VRS-TS2AD103J	AA		C	Resistor (1/10W 10KΩ ±5%) [R98-113,117,118,133,134,140-148]
	VRS-TS2AD103J	AA		C	Resistor (1/10W 10KΩ ±5%) [R161-164,167,169-187,192,1,2]
12	VRS-TS2AD333J	AA		C	Resistor (1/10W 33KΩ ±5%) [R136]
13	VRS-TS2AD101J	AA		C	Resistor (1/10W 100Ω ±5%) [R16-26]
14	VRS-TS2AD272J	AA		C	Resistor (1/10W 2.7KΩ ±5%) [R74,75]
15	VRS-TS2AD912G	AA		C	Resistor (1/10W 9.1KΩ ±2%) [R77]
16	VRS-TS2AD221J	AA		C	Resistor (1/10W 220Ω ±5%) [R84]
17	VRS-TS2AD473J	AA		C	Resistor (1/10W 47KΩ ±5%) [R28,41,70,193]
18	VRS-TS2AD562J	AA		C	Resistor (1/10W 5.6KΩ ±5%) [R81,128,135,149]
19	VRS-TS2AD563J	AA		C	Resistor (1/10W 56KΩ ±5%) [R76]
20	VRS-TS2AD472J	AA		C	Resistor (1/10W 4.7KΩ ±5%) [R3,5,6,9,29,93,121,123,189]
21	VRS-TS2AD102J	AA		C	Resistor (1/10W 1.0KΩ ±5%) [R10,11,83,114-116,119,120,129]
	VRS-TS2AD102J	AA		C	Resistor (1/10W 1.0KΩ ±5%) [R150-157,160]
22	VRS-TS2AD362F	AA		C	Resistor (1/10W 3.6KΩ ±1%) [R8]
23	VHD1SS353/-1	AB		B	Diode (1SS353) [D9,14]
24	VRS-TS2AD105J	AA		C	Resistor (1/10W 1MΩ ±5%) [R67]
25	VRS-TS2AD133J	AA		C	Resistor (1/10W 13KΩ ±5%) [R188]
26	VRS-TS2AD153G	AA		C	Resistor (1/10W 15KΩ ±2%) [R73]
27	VRS-TS2AD163F	AA		C	Resistor (1/10W 16KΩ ±1%) [R7]
28	VRS-TS2AD183F	AA		C	Resistor (1/10W 18KΩ ±1%) [R92]
29	VRS-TS2AD203J	AA		C	Resistor (1/10W 20KΩ ±5%) [R97]
30	VRS-TS2AD222J	AA		C	Resistor (1/10W 2.2KΩ ±5%) [R137,138]
31	VRS-TS2AD223J	AA		C	Resistor (1/10W 22KΩ ±5%) [R30]
32	VRS-TS2AD241J	AA		C	Resistor (1/10W 240Ω ±5%) [R122]
33	VRS-TS2AD2R2J	AA		C	Resistor (1/10W 2.2Ω ±5%) [R159]
34	VRS-TS2AD331J	AA		C	Resistor (1/10W 330Ω ±5%) [R68,80,82]
35	VRS-TS2AD680F	AA		C	Resistor (1/10W 68Ω ±1%) [R96]
36	VRS-TS2AD822G	AA		C	Resistor (1/10W 8.2KΩ ±2%) [R72]
37	VRSTS2AD1151F	AA		C	Resistor (1/10W 1150Ω ±1%) [R94]
38	VRSTS2AD1330F	AA		C	Resistor (1/10W 133Ω ±1%) [R95]
39	VCKYTV1HF104Z	AA		C	Capacitor (50WV 0.10μF) [C45-47,53,66,68,92,94]
	VCKYTV1HF104Z	AA		C	Capacitor (50WV 0.10μF) [C96,99,100,125,129,151,152]
40	VCKYTV1HB102K	AA		C	Capacitor (50WV 1000PF) [C1,52,85-87,103,150,167]
41	VCCCTV1HH331J	AA		C	Capacitor (50WV 330pF) [C38,39,42,61-65,75-78]
	VCCCTV1HH331J	AA		C	Capacitor (50WV 330pF) [C117-123,148,149,168,174,40]
42	VCCCTV1HH101J	AA		C	Capacitor (50WV 100PF) [C3-37,50,51,70-74,79-81,88,89]
	VCCCTV1HH101J	AA		C	Capacitor (50WV 100PF) [C108,124,171]
43	VCKYTV1HB103K	AB		C	Capacitor (50WV 0.010μF) [C60]
44	VCCCTV1HH470J	AA		C	Capacitor (50WV 47PF) [C130-147,154-162,169,170,178]
45	VCKYTV1HB332K	AA		C	Capacitor (50WV 3300PF) [C105]
46	VS2SA1036KQRC	AB		B	Transistor (2SA1036) [Q8]
47	RCORF7002BHZZ	AE		C	Chip core (EFCB322513TS) [B1,2,15-24,26,27]
48	VHD1N4002G/-1	AA		B	Diode (1N4002G) [D2,3,5]
49	VHDDSS133HV-1	AA		B	Diode (DSS133HV) [D1]
50	VHDEU1Z///-1	AB		B	Diode (EU1Z) [D4,6]
51	VHEMTZ4.3B/-1	AA		B	Zener diode (MTZ4.3B) [ZD4]
52	VHEMTZ5.1A/-1	AC		B	Zener diode (MTZ5.1A) [ZD1]
53	VHEMTZ5.6A/-1	AA		B	Zener diode (MTZ5.6A) [ZD3]
54	VHERD5.6FB3-1	AC		B	Zener diode (RD5.6FB3) [ZD6]
55	QFSDH2109AFZZ	AC		C	Fuse holder (HD2109AF) [F1,2,3]
56	VCQYNA1HM333K	AA		C	Capacitor (50WV 0.033μF) [C101]
57	VCEAGA1CW106M	AA		C	Capacitor (16WV 10μF) [C91,93,95,173,175]
58	VCEAGA1HW105M	AB		C	Capacitor (50WV 1.0μF) [C102]
59	VCEAGA1HW106M	AA		C	Capacitor (50WV 10μF) [C67,115,153]
60	VCEAGA1CW337M	AB		C	Capacitor (16WV 330μF) [C113]
61	VCEAGA1CW107M	AC		C	Capacitor (16WV 100μF) [C112]
62	VCEAGA1HW107M	AA		C	Capacitor (50WV 100μF) [C114]
63	VCEAGA1CW477M	AB		C	Capacitor (16WV 470μF) [C111]
64	VCEAGA1HW476M	AB		C	Capacitor (40WV 47μF) [C109]
65	VCEAGA1HW335M	AB		C	Capacitor (50WV 3.3μF) [C110]
66	RC-EZ106ARC1A	AD		C	Capacitor (10WV 10μF) [C48,97,98,126,165]
67	RC-EZ476ARC1A	AF		C	Capacitor (10WV 47μF) [C49,84]
68	RC-KZ1054CCZZ	AB		C	Capacitor (0.1μF 50WV) [C127]
69	RCORF6685BHZZ	AC		C	Bead core (BFB2070RZ) [B3-14,25,FIL2-7]
70	RCORF6702BHZZ	AF		C	EMI filter (100pF) [FIL1]
71	RCRSP5019BCZZ	AD		B	Crystal (7.37MHz) [X2]
72	VCEAGU2AW106M	AB		C	Capacitor (100WV 10μF) [C128]
73	VHikIA431/-1	AH		B	IC (KIA431) [IC20A]
74	VRD-RC2EY000J	AA		C	Resistor (1/10W 0Ω ±5%) [J3]

5 Main PWB unit

NO.	PARTS CODE	PRICE RANK	NEW MARK	PART RANK	DESCRIPTION
75	VSDSC001-B/-1	AA		B	Transistor (DSC001-B) [Q6,11,12]
76	LX-BZ6644BHZZ	AA		C	Screw (M3.5 × 8S) (for Heat sink)
77	PRDAF6654BHZZ	AM		C	Heat sink [(IC17)]
78	PRDAF6656BHZZ	AK		C	Heat sink [(Q5)]
79	QCNCM1101CCZZ	AB		C	Connector (2pin) [CN6]
80	QCNCM5278NCZZ	AC		C	Connector (5046-03A) [CN1,2]
81	QCNCM7071RC6H	AN		C	Connector (68pin) [CN7]
82	QCNCM7176BH0E	AC		C	Connector (53014-0510) [CN12]
83	QCNCM7176BH0G	AD		C	Connector (53014-0710) [CN10]
84	QCNCM7176BH1B	AD		C	Connector (53014-1210) [CN14]
85	QCNCM7176BH1J	AD		C	Connector (53014-1010) [CN8,15]
86	QCNCM7178BH3F	AL		C	Connector (52044-3610) [CN5,9]
87	QCNCM7183BH2F	AR		C	Connector (26pin) [CN13]
88	QCNCW-7769BHZZ	AE		C	GND wire ((Main PWB(GND5)-Drawer))
89	QFS-A1037CCZZ	AC		A	Fuse (1.5A) (MINI TYPE) [F1]
90	QFS-C2521TAZZ	AE		A	Fuse (250V 2.5A) [F3]
91	QFS-C4081CCZZ	AF		A	Fuse (250V 2.5A) [F2]
92	QSOCZ2042SC32	AE		C	IC socket (32pin) [IC11,15,16]
93	RC-EZ6881RC1J	AZ		C	Capacitor (63WV 6800μF) [C107]
94	RCILC6653BHZZ	AS		C	Choke coil (180μH) [L1]
95	RCSRSP6664RCZZ	AF		B	Crystal (19.66MHz) [X1]
96	RMPTC8103QCKB	AD		B	Block resistor (10KΩ × 8 1/8W ±10%) [RA1,2]
97	RR-XZ8R2FRC3A	AC		B	Fuse resistor (1W 82Ω) (FRN1-8R2) [R139]
98	RTRNH6882RCZZ	AM		B	Transformer [T1]
99	VCEAGA1HW228M	AB		C	Capacitor 50WV 2200μF [C106,166]
100	VHDCP301///-1	AL		B	Diode (CP301) [BD1]
101	VH14AC16///-1	AK		B	IC (4AC16) [IC25,26]
102	VHISTR2124/-1	AR		B	IC (STR2124) [IC17]
103	VH1TA8428K/-1	AN		B	IC (TA8428K) [IC28]
104	VS2SC4153/-1	AG		B	Transistor (2SC4153) [Q5]
105	VS2SJ263///-1	AM		B	Transistor (2SJ263) [Q10]
106	XBPSD30P06000	AA		C	Screw (M3 × 6) [(Q5)]
107	XBPSD30P10000	AA		C	Screw (M3 × 10) [(IC17)]
108	VH127040RAV1A	BL	N	B	IC (27040RAV1A) [IC11]
109	QCNCW7165BH0B	AF		C	Short socket (2pin) [JP3]
110	QCNCM7139BH0D	AF		C	Connector (4pin) [JP3,4]
111	UBATN6639RCZZ	AS		B	Battery (170MA 2.4V) [BT1]
112	QCNCW-7749BHZZ	AP		C	OP flat cable (36p) (Main PWB-OP Memory PWB)
	(Unit)				
901	CPWBX7466BH03	CM	N	E	Main PWB unit [KB,TQ,TR,TS]
	CPWBX7466BH05	CM	N	E	Main PWB unit [KA]

6 Key I/F PWB unit

NO.	PARTS CODE	PRICE RANK	NEW MARK	PART RANK	DESCRIPTION
1	VRD-RC2EY473J	AA		C	Resistor (1/4W 47KΩ ±5%) [R1,2,3,4,5,6,7,8,9,10]
2	VHDDSS133HV-1	AA		B	Diode (DSS133HV) [D1-22](KA,KB)
	VHDDSS133HV-1	AA		B	Diode (DSS133HV) [D1-22,24](TQ,TR,TS)
3	RC-Z1N104BHZZ	AC		C	Capacitor (12WV 0.1μF) [C1,2,3,4]
4	RMPTC8473QCKB	AC		B	Block resistor (47KΩ × 8 1/8W ±10%) [RA1]
5	VH1SN74LS138N	AG		B	IC (SN74LS138N) [IC1,2]
6	VH1T74HC153-C	AN		B	IC (74HC153P) [IC3,4]
7	QCNCM6865BH1A	AE		C	Connector (Mode S/W) (5267-11A) [CN2]
8	QCNCW-7748BHZZ	AM		C	Cable (Key I/F- Display) (10P) [CN4]
9	QCNCW-7747BHZZ	AM		C	Cable (Key I/F- Display) (9P) [CN3]
10	QCNCW7118BH1H	AM		C	Connector (18pin) (K/B) (5229-18CPB) [CN5]
11	QCNCM7118BH0I	AF		C	Connector (9pin) (K/B) (5229-09CPB) [CN6]
12	QCNCW-7769BHZZ	AE		C	GND wire
13	QCNCM7168BH0C	AE		C	Connector (W-P9003 #50) [CN1]
14	QCNCM7169BH0C	AF		C	Connector (CLP2503-0101) [CN8]
	(Unit)				
901	CPWBF7455BH04	BE		E	Key I/F PWB unit (Flat) [KA,KB]
	CPWBF7455BH03	BE		E	Key I/F PWB unit [TQ,TR,TS]

7 Display PWB unit

NO.	PARTS CODE	PRICE RANK	NEW MARK	PART RANK	DESCRIPTION
1	VRD-RC2EY000J	AA		C	Resistor (1/4W 0Ω ±5%) [FL1,2]
2	VRD-RC2EY473J	AA		C	Resistor (1/4W 47KΩ ±5%) [R1,2]
3	VRD-RC2EY472J	AA		C	Resistor (1/4W 4.7KΩ ±5%) [R3,4]
4	VRD-RC2EY202J	AA		C	Resistor (1/4W 2.0KΩ ±5%) [R9,10,11,12,13,14,17,18,19,20]
5	VRD-RC2EY330J	AA		C	Resistor (1/4W 33Ω ±5%) [R5,6,7,8]
6	VRD-RC2EY221J	AA		C	Resistor (1/4W 220Ω ±5%) [R21]
7	VRD-RC2EY105J	AA		C	Resistor (1/4W 1.0KΩ ±5%) [R22]
8	VRD-RC2EY273G	AA		C	Resistor (1/4W 27KΩ ±2%) [R0]
9	VHEMTZJ39C/-1	AB		B	Zener diode (MTZJ39C) [ZD1]
10	VRD-RC2EY3R3J	AA		C	Resistor (1/4W 3.3Ω ±5%) [R15,16]
11	VRD-RC2EY222J	AA		C	Resistor (1/4W 2.2KΩ ±5%) [R24]
12	VRD-RC2EY123J	AA		C	Resistor (1/4W 12KΩ ±5%) [R23]
13	VHDDSS133HV-1	AA		B	Diode (DSS133HV) [D2]
14	RC-KZ1054CCZZ	AB		C	Capacitor (50WV 0.1μF) [C3,4,6,13,21,22]
15	RC-EZ106ARC1A	AD		C	Capacitor (10WV 10μF) [C8,20]
16	VCCCPU1HH150J	AA		C	Capacitor (50WV 15PF) [C14,15]
17	VCEAEU1CW106M	AA		C	Capacitor (16WV 10μF) [C7]
18	VCKYPU1HB102K	AA		C	Capacitor (50WV 1000PF) [C2,19]
19	VCKYPU1HB471K	AA		C	Capacitor (50WV 470PF) [C0,1,9,11,12,16,17,18]
20	VCKYPU1HB101K	AA		C	Capacitor (50WV 100PF) [C23]
21	VCKYPU1HB222K	AA		C	Capacitor (50WV 2200PF) [C10]
22	VSDSC001-B/CC	AA		B	Transistor (DSC001-B/CC) (2SC3198) [Q1]
23	VHiH4728A91FS	AX		B	IC (H4728A91FS) [IC1]
24	VHiM66004FP-1	AY		B	IC (M66004FP) [IC2]
25	RCRSZ6644RCZZ	AD		B	Crystal (4.19MHz) [X1]
26	RCRSP1003CCZZ	AF		B	Crystal (32KHz) [X2]
27	RMP TC4104QCKB	AC		B	Block resistor (100KΩ × 4 1/8W ±10%) [RA3]
28	RMP TC7104QCKB	AC		B	Block resistor (100KΩ × 7 1/4W ±10%) [RA2]
29	RMP TC8104QCKB	AD		B	Block resistor (100KΩ × 8 1/8W ±10%) [RA1]
30	RMP TE4471RCHZ	AD		B	Capacitor array (470pF × 4) [CA1]
31	QCNCW-7751BHZZ	AV		C	Cable (DISP-MAIN) [CN6,7]
32	QCNCM7176BH0H	AD		C	Connector (KEY) (5394-0810) [CN3]
33	QCNCM7176BH0i	AD		C	Connector (KEY) (53014-0910) [CN4]
34	QCNCM6865RC0H	AC		C	Connector (Pop up) (5267-08A) [CN1]
35	QCNCM6865RC1J	AC		C	Connector (10pin) [CN2]
36	RALMB6646BHZZ	AQ		B	Buzzer [BZ]
37	VVK22MT03G/-1	BM		B	Display tube
38	LBNDJ2003SCZZ	AA		C	Cable band (Large)
	(Unit)				
901	CPWBN7459BH01	BW		E	Display PWB unit

8 IR PWB unit

NO.	PARTS CODE	PRICE RANK	NEW MARK	PART RANK	DESCRIPTION
1	VCCCCY1HH101J	AA		C	Capacitor (50WV 100PF) [C46]
2	VCCCTV1HH200J	AA		C	Capacitor (50WV 20PF) [C49,61]
3	VCKYCY1HB102K	AA		C	Capacitor (50WV 1000PF) [C47]
4	VCKYTV1HB103K	AB		C	Capacitor (50WV 0.010μF) [C44]
5	VCKYCY1HB222K	AA		C	Capacitor (50WV 2200PF) [C48]
6	VCKYCY1HF104Z	AA		C	Capacitor (50WV 0.10μF) [C45,50,51,52]
7	VHiIR9393N/-1	AD		B	IC (IR9393N) [IC1]
8	VRD-RB2HY150J	AA		C	Resistor (1/2W 15Ω ±5%) [R71]
9	VRS-TS2AD101J	AA		C	Resistor (1/10W 100Ω ±5%) [R68,69]
10	VRS-TS2AD102J	AA		C	Resistor (1/10W 1.0KΩ ±5%) [R72]
11	VRS-TS2AD103J	AA		C	Resistor (1/10W 10KΩ ±5%) [R56,61,62]
12	VRS-TS2AD104J	AA		C	Resistor (1/10W 100KΩ ±5%) [R51]
13	VRS-TS2AD110J	AA		C	Resistor (1/10W 11Ω ±5%) [R70]
14	VRS-TS2AD182J	AA		C	Resistor (1/10W 1.8KΩ ±5%) [R52]
15	VRS-TS2AD223J	AA		C	Resistor (1/10W 22KΩ ±5%) [R55]
16	VRS-TS2AD332J	AA		C	Resistor (1/10W 3.3KΩ ±5%) [R50,67]
17	VRS-TS2AD333J	AA		C	Resistor (1/10W 33KΩ ±5%) [R66,54]
18	VRS-TS2AD363J	AA		C	Resistor (1/10W 36KΩ ±5%) [R58]
19	VRS-TS2AD393G	AA		C	Resistor (1/10W 39KΩ ±2%) [R63]
20	VRS-TS2AD393J	AA		C	Resistor (1/10W 39KΩ ±5%) [R57]
21	VRS-TS2AD432J	AA		C	Resistor (1/10W 4.3KΩ ±5%) [R60]
22	VRS-TS2AD622J	AA		C	Resistor (1/10W 6.2KΩ ±5%) [R59]
23	VRS-TS2AD623G	AB		C	Resistor (1/10W 62KΩ ±2%) [R65]
24	VS2SC4405-/-1	AD		B	Transistor (2SC4405) [Q3]
25	VSUMX5///// -1	AC		B	Transistor (UMX5) [Q1,2]
26	VRS-TS2AD821J	AA		C	Resistor (1/10W 820Ω ±5%) [R64]
27	VRS-TS2AD563J	AA		C	Resistor (1/10W 56KΩ ±5%) [R53]
28	VHPPD410Pi/-1	AE		B	Photo transistor (PD410Pi) [PD1]
29	VHPSIR320ST3N	AD		B	LED (SIR320ST3N) [LED1,2]
30	QCNCM7179BH0E	AD		C	Connector (5P) (53015-0510) [CN1]
31	LHLDZ6835BHZZ	AL		C	LED housing
32	PSPAG6730BHZZ	AE		C	Photo diode cushion

8 IR PWB unit

NO.	PARTS CODE	PRICE RANK	NEW MARK	PART RANK	DESCRIPTION
33	PSLDM6638BHZZ	AG		C	IR PWB shield case
34	PSLDM6637BHZZ	AG		C	Photo diode case
35	RC-EZ106ARC1A	AD		C	Capacitor (10WV 10μ F)
	(Unit)				
901	CPWBN7460BH01	BB		E	IR PWB unit

9 Pop-up PWB unit

NO.	PARTS CODE	PRICE RANK	NEW MARK	PART RANK	DESCRIPTION
1	QCNCW7083BH08	AM		C	Connector (8pin) [CN1]
2	QCNCW7083BH10	AP		C	Connector (10pin) [CN2]
3	VVK7MT143G/-1	AX		B	Display tube
4	LBNDJ2003SCZZ	AA		C	Cable band (Large)
	(Unit)				
901	CPWBF7456BH01	BG		E	Pop up PWB unit

10 ROM/RAM PWB unit

NO.	PARTS CODE	PRICE RANK	NEW MARK	PART RANK	DESCRIPTION
1	QCNCM7178BH3D	AM		C	Connector (52044-3410) [CN201]
2	QSOCZ2042SC32	AE		C	IC socket (32pin) [IC101,102]
3	RC-EZ106ARC1A	AD		C	Capacitor (10 μ 10V) [C202,204]
4	RC-KZ1054CCZZ	AB		C	Capacitor (0.1 μ F 12V) [C201,203]
	(Unit)				
901	CPWBN7458BH01	BK		E	ROM/RAM PWB unit

11 Articles for consumption

NO.	PARTS CODE	PRICE RANK	NEW MARK	PART RANK	DESCRIPTION
1	TPAPR6656RC05	BA		S	Roll paper (5pcs./pack 80)
2	PSHEK6830BHZZ	AU		D	Key sheet(Programing)
	PSHEK6840BHZZ	AS	N	D	Key Sheet(Standard) A
	PSHEK6828BHZZ	AK		D	Blank key sheet

12 Service route options & Service tools

[illegible]

Index

PARTS CODE	NO.	PRICE RANK	NEW MARK	PART RANK	
[C]					
CCABM7218BH04	3- 2	BG		D	
CCAS-6678BH01	3-501	BF		E	
CFRM-6682BH02	3-504	AQ		E	
CFRM-6683BH01	3- 16	AW		C	
CKOG-6708RCZZ	12- 11	BU		S	
CLÖK-6683BHZZ	3-503	BK		E	
CPWBF7455BH03	1- 27	BE		E	
"	6-901	BE		E	
CPWBF7455BH04	1- 27	BE		E	
"	6-901	BE		E	
CPWBF7456BH01	1- 6	BG		E	
"	9-901	BG		E	
CPWBN7458BH01	2- 15	BK		E	
"	10-901	BK		E	
CPWBN7459BH01	1- 20	BW		E	
"	7-901	BW		E	
CPWBN7460BH01	1- 4	BB		E	
"	8-901	BB		E	
CPWBX7466BH03	2- 14	CM	N	E	
"	5-901	CM	N	E	
CPWBX7466BH05	2- 14	CM	N	E	
"	5-901	CM	N	E	
[D]					
DKiT-8633RCZZ	12- 5	BE		S	
DUNT-1306BHZZ	3- 42	AX		E	
DUNT-1817BHZZ	1- 15	AY		E	
DUNT-4945BHZZ	12- 4	AY		S	
DUNTK4938RCZZ	1- 41	BE		E	
[G]					
GBÖXD7134BHZA	3-901	BU		E	
GCAB-7215BHZZ	1- 2	AR		D	
GCABA7219BHZZ	2- 19	BL	N	D	
GCABB7214BHZZ	1- 9	BC		D	
GCAS-6678BHZZ	3- 12	BC		D	
GCÖVA7036BHZZ	3- 32	AS		D	
GCÖVA7104BHZZ	2- 23	AV		D	
GCÖVA7105BHZZ	2- 17	AU		D	
GCÖVA7107BHZA	2- 18	AL		D	
GCÖVA7107BHZZ	12- 6	AG		S	
GCÖVA7111BHZZ	1- 13	BA		D	
GCÖVB7101BHZZ	1- 36	BF		D	
GCÖVB7102BHZZ	1- 40	BA		D	
GCÖVB7108BHZZ	12- 2	BA		S	
GCÖVH7106BHZZ	2- 25	AU		D	
GDRW-6678BHZA	3-502	BG		E	
GDRW-6678BHZZ	3- 31	BF		C	
[H]					
HPNLC6833BHZZ	1- 10	AQ	N	D	
[K]					
Ki-ÖB6777BHZA	2- 11	CL	N	E	
Ki-ÖB6777BHZZ	2- 11	CF		E	
[L]					
LANGK7547BHZZ	12-105	AL		C	
LANGT7581BHZZ	12- 6	AM		S	
LANGT7582BHZZ	1- 31	AL		C	
LANGT7583BHZZ	1- 19	AS		C	
LBNDJ2003SCZZ	1- 5	AA		C	
"	2- 4	AA		C	
"	7- 38	AA		C	
"	9- 4	AA		C	
LBNDJ2004BHZZ	2- 35	AB		C	
LBNDJ6636BHZZ	2- 28	AD		C	
LBRC-6663BHZZ	3- 6	AQ		C	
LCHSM6704BHZZ	2- 36	AY		C	
LFRM-6682BHZZ	3- 22	AN		C	
LHLDQ6839BHZZ	2- 39	AL		C	
LHLDW0006SCZZ	2- 8	AB		C	
LHLDW0008SCZZ	1- 17	AA		C	
"	2- 32	AA		C	
LHLDW0024BHZZ	3- 19	AG		C	
LHLDW6820BHZZ	1- 24	AE		C	
LHLDW6821BHZZ	1- 25	AD		C	
LHLDZ6835BHZZ	8- 31	AL		C	
LHLDZ6838BHZZ	1- 42	AD		C	
LKGIM7110BHZZ	1- 28	AE		B	
"	4- 12	AE		B	
LKGIM7111BHZZ	1- 28	AE		B	
"	4- 12	AE		B	
LKGIM7113RCZZ	12- 1	AK		S	

PARTS CODE	NO.	PRICE RANK	NEW MARK	PART RANK	
LKGIM7126RCZZ	12- 3	AL		S	
LKGIM7129BHZZ	1- 28	AE		B	
"	4- 12	AE		B	
LKGIM7331BHZZ	3- 35	AE		B	
"	4- 11	AE		B	
LKGIM7356BHZZ	1- 14	AK		B	
"	4- 10	AK		B	
LKGIW0001BHZZ	1- 29	AS		B	
LKGIW7330BHZZ	3- 33	AY		B	
LPLTM6674BHZZ	3- 37	AY		D	
LPLTM6690BHZZ	12-102	AF		C	
LPLTP6699BHZZ	2- 20	AS		C	
LX-BZ1085CCZZ	2- 21	AA		C	
LX-BZ6644BHZZ	5- 76	AA		C	
LX-BZ6775BHZZ	3- 17	AA		C	
LX-BZ6776BHZZ	3- 13	AA		C	
LX-BZ6782BHZZ	1- 21	AA		C	
"	2- 24	AA		C	
LX-HZ0056BHZZ	2- 59	AA		C	
[M]					
MCAMM6633BHZZ	3- 21	AG		C	
MLEVF6695BHZZ	3- 8	AK		C	
MLEVF6706BHZZ	12-103	AF		C	
MLEVP6715BHZZ	2- 52	AF		C	
MSPRB6711BHZZ	3- 40	AD		C	
MSPRC6712BHZZ	3- 27	AF		C	
MSPRC6736RCZZ	12-104	AC		C	
MSPRK6718BHZZ	3- 36	AF		C	
MSPRT6713BHZZ	3- 18	AD		C	
MSPRT6714BHZZ	3- 7	AE		C	
[N]					
NRÖLP6650BHZZ	3- 4	AP		C	
"	3- 28	AP		C	
NRÖLP6656BHZZ	2- 42	AF		C	
[P]					
PFI LW6942BHZZ	1- 1	AQ		D	
PFI LW6943BHZZ	1- 3	AS		D	
PFI LW6952BHZZ	1- 12	AS		C	
PFI LW6960BHZZ	1- 7	AX		D	
PGUMM6695BHZZ	3- 3	AE		D	
PGUMM6696BHZZ	2- 58	AE		C	
"	3- 25	AE		D	
PRDAF6654BHZZ	5- 77	AM		C	
PRDAF6656BHZZ	5- 78	AK		C	
PRNGT6637BHZZ	3- 34	AA		C	
PRNGT6639BHZZ	1- 34	AB		C	
PSHEK6828BHZZ	1- 39	AK		D	
"	11- 2	AK		D	
PSHEK6830BHZZ	1- 38	AU		D	
"	11- 2	AU		D	
PSHEK6840BHZZ	1- 37	AS	N	D	
"	11- 2	AS	N	D	
PSHEP6681BHZZ	4- 3	AF		D	
PSHEP6839BHZZ	1- 46	AC		C	
PSHEP6840BHZZ	1- 43	AE		C	
PSKR-6628BHZZ	3- 11	AG		C	
PSKR-6629BHZZ	3- 9	AL		C	
PSLDM6637BHZZ	1- 47	AG		C	
"	8- 34	AG		C	
PSLDM6638BHZZ	1- 49	AG		C	
"	8- 33	AG		C	
PSPAG6716RCZZ	1- 54	AC		C	
PSPAG6730BHZZ	1- 48	AE		C	
"	8- 32	AE		C	
[Q]					
QACCE3120QCN5	2- 1	AL		B	
QACCL1018CCN1	2- 1	AV		B	
QCNCM1101CCZZ	5- 79	AB		C	
QCNCM5278NCZZ	5- 80	AC		C	
QCNCM6865BH1A	6- 7	AE		C	
QCNCM6865RC0H	7- 34	AC		C	
QCNCM6865RC1J	7- 35	AC		C	
QCNCM7071RC6H	5- 81	AN		C	
QCNCM7118BH0i	6- 11	AF		C	
QCNCM7139BH0D	5-110	AF		C	
QCNCM7168BH0C	6- 13	AE		C	
QCNCM7169BH0C	6- 14	AF		C	
QCNCM7176BH0E	5- 82	AC		C	
QCNCM7176BH0G	5- 83	AD		C	
QCNCM7176BH0H	7- 32	AD		C	

PARTS CODE	NO.	PRICE RANK	NEW MARK	PART RANK	
QCNCM7176BH01	7- 33	AD		C	
QCNCM7176BH1B	5- 84	AD		C	
QCNCM7176BH1J	5- 85	AD		C	
QCNCM7178BH3D	10- 1	AM		C	
QCNCM7178BH3F	5- 86	AL		C	
QCNCM7179BH0E	8- 30	AD		C	
QCNCM7183BH2F	5- 87	AR		C	
QCNCW7083BH08	9- 1	AM		C	
QCNCW7083BH10	9- 2	AP		C	
QCNCW7118BH1H	6- 10	AM		C	
QCNCW7165BH0B	5-109	AF		C	
QCNW-1035CCZZ	2- 1	AL		B	
QCNW-7122RCZZ	2- 49	AD		C	
QCNW-7747BHZZ	6- 9	AM		C	
QCNW-7748BHZZ	6- 8	AM		C	
QCNW-7749BHZZ	2- 16	AP		C	
"	5-112	AP		C	
QCNW-7751BHZZ	7- 31	AV		C	
QCNW-7752BHZZ	2- 30	AH		C	
QCNW-7753BHZZ	1- 33	AP		C	
QCNW-7754BHZZ	1- 30	AP		C	
QCNW-7767BHZZ	2- 57	AE		C	
QCNW-7768BHZZ	2- 5	AE		C	
QCNW-7769BHZZ	5- 88	AE		C	
"	6- 12	AE		C	
QCNW-7770BHZZ	1- 45	AE		C	
QCNW-7771BHZZ	1- 44	AF		C	
QCNW-7781BHZZ	2- 55	AQ		C	
QCNW-7782BHZZ	2- 56	AP		C	
QCNW-7783BHZZ	2- 54	AQ		C	
QFS-A1037CCZZ	5- 89	AC		A	
QFS-C2521TAZZ	5- 90	AE		A	
QFS-C4081CCZZ	5- 91	AF		A	
QFSHD2109AFZZ	5- 55	AC		C	
QPLGA0006QCZZ	2- 1	AQ		C	
QSÖCZ2042SC32	5- 92	AE		C	
"	10- 2	AE		C	
QSW-C9212QCZZ	2- 43	AH		B	
QSW-M6872BHZZ	3- 14	AR		B	
QSW-M6887BHZZ	12-101	AV		B	
[R]					
RALMB6646BHZZ	7- 36	AQ		B	
RC-EZ106ARC1A	5- 66	AD		C	
"	7- 15	AD		C	
"	8- 35	AD		C	
"	10- 3	AD		C	
RC-EZ476ARC1A	5- 67	AF		C	
RC-EZ6881RC1J	5- 93	AZ		C	
RC-KZ1054CCZZ	5- 68	AB		C	
"	7- 14	AB		C	
"	10- 4	AB		C	
RC-Z1N104BHZZ	6- 3	AC		C	
RCILC6653BHZZ	5- 94	AS		C	
RCÖRF6685BHZZ	5- 69	AC		C	
RCÖRF6696BHZZ	2- 41	AL		C	
RCÖRF6697BHZZ	1- 53	AF		C	
RCÖRF6699BHZZ	1- 23	AU		C	
RCÖRF6700BHZZ	1- 52	AS		C	
RCÖRF6701BHZZ	2- 48	AV		C	
RCÖRF6702BHZZ	5- 70	AF		C	
RCÖRF7002BHZZ	5- 47	AE		C	
RCRSP1003CCZZ	7- 26	AF		B	
RCRSP5019BCZZ	5- 71	AD		B	
RCRSP6664RCZZ	5- 95	AF		B	
RCRSZ6644RCZZ	7- 25	AD		B	
RMPTC4104QCKB	7- 27	AC		B	
RMPTC7104QCKB	7- 28	AC		B	
RMPTC8103QCKB	5- 96	AD		B	
RMPTC8104QCKB	7- 29	AD		B	
RMPTC8473QCKB	6- 4	AC		B	
RMPTE4471RCHZ	7- 30	AD		B	
RPLU-6639BHZZ	3- 15	AZ		B	
RR-XZ8R2FRC3A	5- 97	AC		B	
RTRNH6882RCZZ	5- 98	AM		B	
RTRNP6883BHZZ	2- 3	BF		B	
RTRNP6885BHZZ	2- 3	BG	N	B	
[S]					
SPAKA8255BHZZ	3- 38	AC		D	
SPAKA8337BHZL	4- 2	AU		D	
SPAKA8337BHZR	4- 4	AU		D	

PARTS CODE	NO.	PRICE RANK	NEW MARK	PART RANK	
SPAKA8361BHZL	4- 2	AW	N	D	
SPAKA8361BHZR	4- 4	AW	N	D	
SPAKC8354BHZA	4- 1	BB	N	D	
SPAKC8354BHZZ	4- 1	BA	N	D	
SSAKA5004CCZZ	3- 10	AA		D	
SSAKH0013HCZZ	4- 8	AA		D	
SSAKH3012CCZZ	4- 9	AA		D	
SSAKH3015CCZZ	4- 8	AA		D	
SSAKH4231CCZZ	4- 5	AA		D	
[T]					
TCADH6788BHZA	4- 13	AC		D	
TCAUS6677BHZZ	2- 31	AD		D	
TINSE7350BHZA	4- 7	AY	N	D	
TINSE7350BHZZ	4- 6	BD	N	D	
TINSF7351BHZA	4- 7	AY	N	D	
TINSF7351BHZZ	4- 6	BD	N	D	
TINSG7352BHZA	4- 7	AY	N	D	
TINSG7352BHZZ	4- 6	BD	N	D	
TINSS7353BHZA	4- 7	AY	N	D	
TINSS7353BHZZ	4- 6	BD	N	D	
TPAPR6656RC05	11- 1	BA		S	
[U]					
UBATN6639RCZZ	5-111	AS		B	
UKÖG-6705RCZZ	12- 12	BC		S	
[V]					
VCCCCY1HH101J	8- 1	AA		C	
VCCCPU1HH150J	7- 16	AA		C	
VCCCTV1HH101J	5- 42	AA		C	
VCCCTV1HH200J	8- 2	AA		C	
VCCCTV1HH331J	5- 41	AA		C	
VCCCTV1HH470J	5- 44	AA		C	
VCEAEU1CW106M	7- 17	AA		C	
VCEAGA1CW106M	5- 57	AA		C	
VCEAGA1CW107M	5- 61	AC		C	
VCEAGA1CW337M	5- 60	AB		C	
VCEAGA1CW477M	5- 63	AB		C	
VCEAGA1HW105M	5- 58	AB		C	
VCEAGA1HW106M	5- 59	AA		C	
VCEAGA1HW107M	5- 62	AA		C	
VCEAGA1HW228M	5- 99	AB		C	
VCEAGA1HW335M	5- 65	AB		C	
VCEAGA1HW476M	5- 64	AB		C	
VCEAGU2AW106M	5- 72	AB		C	
VCKYCY1HB102K	8- 3	AA		C	
VCKYCY1HB222K	8- 5	AA		C	
VCKYCY1HF104Z	8- 6	AA		C	
VCKYPU1HB101K	7- 20	AA		C	
VCKYPU1HB102K	7- 18	AA		C	
VCKYPU1HB222K	7- 21	AA		C	
VCKYPU1HB471K	7- 19	AA		C	
VCKYTV1HB102K	5- 40	AA		C	
VCKYTV1HB103K	5- 43	AB		C	
"	8- 4	AB		C	
VCKYTV1HB332K	5- 45	AA		C	
VCKYTV1HF104Z	5- 39	AA		C	
VCQYNA1HM333K	5- 56	AA		C	
VHDCP301///-1	5-100	AL		B	
VHDDSS133HV-1	5- 49	AA		B	
"	6- 2	AA		B	
"	7- 13	AA		B	
VHDEU1Z///-1	5- 50	AB		B	
VHD1N4002G/-1	5- 48	AA		B	
VHD1SS353///-1	5- 23	AB		B	
VHEMTZJ39C/-1	7- 9	AB		B	
VHEMTZ4.3B/-1	5- 51	AA		B	
VHEMTZ5.1A/-1	5- 52	AC		B	
VHEMTZ5.6A/-1	5- 53	AA		B	
VHERD5.6FB3-1	5- 54	AC		B	
VHiF258024PC/-	5- 1	AZ		B	
VHiG76C256F70	5- 2	BC		B	
VHiH4728A91FS	7- 23	AX		B	
VHiH641510810	5- 4	BA		B	
VHiIR9393N/-1	5- 5	AD		B	
"	8- 7	AD		B	
VHiKiA431///-1	5- 73	AH		B	
VHiLC3564SM70	5- 6	AS		B	
VHiLZ9AH30/-1	5- 7	BA		B	
VHiMC74HC138F	5- 3	AG		B	
VHiM66004FP-1	7- 24	AY		B	
VHiSN74HC00NS	5- 8	AC		B	

PARTS CODE	NO.	PRICE RANK	NEW MARK	PART RANK
VHISN74LS138N	6- 5	AG		B
VHISTR2124/-1	5-102	AR		B
VHITA8428K/-1	5-103	AN		B
VHITD62308F-1	5- 9	AH		B
VHIT74HC153-C	6- 6	AN		B
VH127040RAV1A	5-108	BL	N	B
VH14AC16///-1	5-101	AK		B
VHPPD410PI/-1	8- 28	AE		B
VHPSiR320ST3N	8- 29	AD		B
VRD-RB2HY150J	8- 8	AA		C
VRD-RC2EY000J	5- 74	AA		C
//	7- 1	AA		C
VRD-RC2EY105J	7- 7	AA		C
VRD-RC2EY123J	7- 12	AA		C
VRD-RC2EY202J	7- 4	AA		C
VRD-RC2EY221J	7- 6	AA		C
VRD-RC2EY222J	7- 11	AA		C
VRD-RC2EY273G	7- 8	AA		C
VRD-RC2EY3R3J	7- 10	AA		C
VRD-RC2EY330J	7- 5	AA		C
VRD-RC2EY472J	7- 3	AA		C
VRD-RC2EY473J	6- 1	AA		C
//	7- 2	AA		C
VRS-TS2AD101J	5- 13	AA		C
//	8- 9	AA		C
VRS-TS2AD102J	5- 21	AA		C
//	8- 10	AA		C
VRS-TS2AD103J	5- 11	AA		C
//	8- 11	AA		C
VRS-TS2AD104J	8- 12	AA		C
VRS-TS2AD105J	5- 24	AA		C
VRS-TS2AD110J	8- 13	AA		C
VRS-TS2AD133J	5- 25	AA		C
VRS-TS2AD153G	5- 26	AA		C
VRS-TS2AD163F	5- 27	AA		C
VRS-TS2AD182J	8- 14	AA		C
VRS-TS2AD183F	5- 28	AA		C
VRS-TS2AD2R2J	5- 33	AA		C
VRS-TS2AD203J	5- 29	AA		C
VRS-TS2AD221J	5- 16	AA		C
VRS-TS2AD222J	5- 30	AA		C
VRS-TS2AD223J	5- 31	AA		C
//	8- 15	AA		C
VRS-TS2AD241J	5- 32	AA		C
VRS-TS2AD272J	5- 14	AA		C
VRS-TS2AD331J	5- 34	AA		C
VRS-TS2AD332J	8- 16	AA		C
VRS-TS2AD333J	5- 12	AA		C
//	8- 17	AA		C
VRS-TS2AD362F	5- 22	AA		C
VRS-TS2AD363J	8- 18	AA		C
VRS-TS2AD393G	8- 19	AA		C
VRS-TS2AD393J	8- 20	AA		C
VRS-TS2AD432J	8- 21	AA		C
VRS-TS2AD472J	5- 20	AA		C
VRS-TS2AD473J	5- 17	AA		C
VRS-TS2AD562J	5- 18	AA		C
VRS-TS2AD563J	5- 19	AA		C
//	8- 27	AA		C
VRS-TS2AD622J	8- 22	AA		C
VRS-TS2AD623G	8- 23	AB		C
VRS-TS2AD680F	5- 35	AA		C
VRS-TS2AD821J	8- 26	AA		C
VRS-TS2AD822G	5- 36	AA		C
VRS-TS2AD912G	5- 15	AA		C
VRSTS2AD1151F	5- 37	AA		C
VRSTS2AD1330F	5- 38	AA		C
VSDSC001-B/-1	5- 75	AA		B
VSDSC001-B/CC	7- 22	AA		B
VSUMX5////////-1	8- 25	AC		B
VS2SA1036KQRC	5- 46	AB		B
VS2SC4153-/-1	5-104	AG		B
VS2SC4405-/-1	8- 24	AD		B
VS2SJ263///-1	5-105	AM		B
VS2SJ328-Z/-1	5- 10	AP		B
VVK22MT03G/-1	7- 37	BM		B
VVK7MT143G/-1	9- 3	AX		B
{X}				
XBBSC30P06000	1- 8	AA		C
XBBSC30P20000	2- 22	AA		C

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